THE MARINE REVIEW

VOL. 47 CLEVELAND OCTOBER, 1917 NEW YORK No. 10

Using Lake Ships to Fight U-Boats

Fresh Water Fleets Called Upon to Furnish Boats to Meet Shortage in Ocean Tonnage — Lake Trade Must Be Carefully Considered

WHETHER Germany's last card—her submarines—is a high trump or merely a discard, will be known definitely this winter. A well-defined belief has grown up, not only in the chancellories of the allied nations, but in the public mind as well, that the low point in the world's tonnage will be reached some time during the next few months.

The inauguration of the ruthless submarine campaign on Feb. 1 found the shipyards of the allies unprepared to match tonnage destruction with tonnage production. While the empty boasts and promises of German officialdom that the submersibles would bring the war to an end within a month have been long since disproved, the seriousness of the danger has never been lost sight of by the allies. Ship construction has been speeded up with encouraging rapidity. England, for instance, turned out about 580,000 tons of shipping in 1916. According to Premier Lloyd George, the 1917 figure will be four times as large, or an output this year of 2,300,000 tons against the *ante bellum* record of 2,050,000 tons. For 1918, the premier indicated the output would reach 3,480,000 tons.

American Yards Doing Their Share

The shipping board, according to its program as presented to congress, has contracted for 433 ships, has 452 additional ready to let when funds are furnished, and is negotiating for 237 more. Adding the commandeered ships which must enter only the trades approved by the allies, the idle German and Austrian tonnage recommissioned and the tonnage still to be ordered in yards under construction or to be built, the extent of this country's gain in tonnage in the next year is certain to be immense.

These new ships naturally cannot be completed during the next few months and to tide over the critical period between now and the time when the yards will be turning out boats rapidly, the shipping board is seeking tonnage wherever available.

The Great Lakes, with their immense fleet inactive during the winter season, naturally will be called upon to supply every ship which can be advantageously taken to the coast. The anomaly of having a serious shortage of ships at the eastern seaboard, while dozens of boats of Welland canal size are moored at lake ports, must be corrected, but the process should be undertaken with a full appreciation of the importance of lake commerce.

War Problems of the Great Lakes

Vessel owners on the Great Lakes are now confronted with three problems, each as essential as that of carrying supplies to our soldiers on French soil. These problems are those of moving sufficient iron ore to satisfy the demands of the iron and steel industry until the opening of navigation next year; of transporting sufficient coal to meet the fuel requirements of the northwest until next spring; and of carrying every possible ton of grain from the American and Canadian west and thus lighten the already overtaxed railroads of that much additional burden this winter.

On a peace basis, the lake fleet, in the face of the inability of the railroads to keep freight moving out of unloading ports as rapidly as the vessels bring it in, might find this triple task impossible of accomplishment. On a war basis, such as is now being followed, the tasks may be handled successfully, provided no serious delays are met with. A central committee has been given general supervision over the boats in these three trades. This centralized control is expected to preserve a proper adjustment between the needs of the ore, coal and grain consumers; to keep boats away from ports which threaten to become overcrowded and to direct the vessels to harbors where quick dispatch can be given; and to supervise the loading so that ships will carry the cargo for which unloading facilities are available.

Preliminary investigation has shown that from 75 to 125 lake boats can be taken to the coast this fall, the number depending upon the kinds desired. The needs of lake commerce must be fully considered before definite action is taken.

Lake Vesselmen Meet U. S. Request

Unanimous Approval Given to Grain Rate of 4½ Cents Set by Food Administration —Merchant Officers Needed for Salt Water Service—New Bill of Lading Adopted

VESSEL owners of the Great Lakes on Sept. 10 met at Cleveland and unanimously approved resolutions calling for the fullest co-operation with the government in moving the immense tonnage of grain from the northwest to lower lake ports this fall. This co-operation was expressed in tangible form by placing the operation of most of the lake boats under the guidance of a central committee which already has worked successfully in straightening out the coal situation and which now in effect will have supervision over the movement of iron ore, coal and grain on the lakes. The desire of the vessel interests to support the government in prosecuting the war also was shown by the unanimous approval given to the grain rate of 4½ cents from ports at the head of Lake Superior to Buffalo—a rate suggested by the government and approved by a subcommittee of vessel owners.

The meeting was attended by representatives of most of the steamship companies, including many members of the Lake Carriers' association and others. The conference was called at the request of federal authorities in order that a clear understanding of the government's needs might be obtained by the shipowners. The government, through a representative of the navy department, also directed attention to the scarcity of junior officers on the Atlantic coast and urged that the Great Lakes interests make every effort to supply several hundred officers to man merchant ships now going into commission under governmental direction.

December Rate Not Fixed

The new rate of 4½ cents will remain in effect for the regular season of navigation which closes at midnight, Nov. 30. The rate for December loading and for storage will be discussed at a later meeting. This rate will be the maximum and during the regular shipping season no higher charges are to be made but chartering may be done at the going rate until the stipulated figure is reached.

The government was represented by Julius H. Barnes, director of the grain division of the food administration. Mr. Barnes opened the conference by emphasizing the importance which the food administration attaches to the rapid movement of the maximum tonnage of grain this fall. He made it clear to the vessel owners that the government intends to take an active part in expediting the movement. One central authority, for instance, stationed at Buffalo will represent both the Canadian and American governments. Boats going to Buffalo will be consigned in care of the food administration. By having the unloading arrangements under the direct supervision of one head, the government hopes to avoid all unnecessary delay in unloading. With the government acting as practically the only buyer it will be entirely feasible to dispatch boats to any port where unloading facilities can be obtained. At the same time, loading arrangements can be so perfected that boats will not take on cargoes consigned to ports which are already congested.

The loading of the grain will be handled by brokers under a pooling arrangement. For this purpose the Duluth Grain Chartering Corp. has been organized and the earnings of this company will be prorated among the different agents, using their chartering business of the past five years as a basis. This corporation has elected H. H. Dinham, of the Duluth Shipping Co., president; Ray C. Helm, D. T. Helm & Co., vice president and treasurer; and D. W. Stocking of the Tomlinson company, Duluth, as secretary.

New Grain Bill of Lading Approved by Lake Shipowners

SHIPPED in good order and condition by..... as agents and forwarders, for account and risk of whom it may concern, on board the..... whereof.....is master, now in the port of.....and bound for....., the following property as herein described, shippers' weight (Weight, quality and value unknown to the undersigned), to be delivered in like good order and condition (the dangers of navigation, fire and collision excepted), as consigned herein or to his or their assigns or assignees upon paying the freight and charges as noted below. The carrier shall make no claim for any overrun in the out-turn of cargo, and assumes no responsibility for shortage or for differences in weights caused by natural shrinkage or discrepancies in elevator weights, but the carrier shall allow a fixed amount of one quarter bushel per thousand bushels as tare, the same to be deducted from the freight. All grain on board is to be delivered and freight is to be collected upon out-turn weight. Where two or more shipments are carried in the same compartment of the vessel, the shortage, if any, resulting upon unloading the last of these, shall be borne pro rata by the shippers.

If the owner of the ship shall have exercised due diligence to make said ship in all respects seaworthy and properly manned, equipped and supplied, it is hereby agreed that in case of danger, damage or disaster resulting from fault or negligence of the pilot, master or crew, in the navigation or management of the ship, or from latent or other defects, or unseaworthiness of the ship whether existing at time of shipment, or at the beginning of the voyage, but not discoverable by due diligence, the consignees or owners of the cargo shall not be exempted from liability for contribution in General Average, or for any special charges incurred, but with the Shipowner, shall contribute in General Average, and shall pay such special charges as if such danger, damage or disaster had not resulted from such fault, negligence, latent or other defects or unseaworthiness.

Permission given to tow and be towed and for reasonable deviation for that purpose.

IN WITNESS WHEREOF, the agents of the said vessel have affirmed to one Bill of Lading and copies thereof, the ORIGINAL Bill of Lading being alone negotiable, and the said copies marked on their face as follows: "Copy—Not Negotiable".

Order of
Care of
Notify

ORIGINAL

.....Bushels of
Freight from Duluth to
being cents per bushel of
pounds.
Grain loaded.

It is freely predicted that the time spent by vessels in loading ports will be considerably reduced this year. For instance, vessels will not be required to shift from one elevator to another in order to fill out a cargo of the grade desired by an individual buyer. Every effort will be made to move the grain and the question of grade will be of secondary importance as the government, in its position as the only buyer, can easily handle the question of grading after the grain reaches lower lake ports or seaboard ports.

The committee which will have general supervision over the bulk freight movement on the Great Lakes during the remainder of the season will include W. H. McGean, chairman; John T. Kelly, A. W. Thomson, W. M. Williams, R. H. Pigot, J. Burton Avers, F. J. Sullivan, and Carl Timmerman. The first three named have been acting for some weeks in an advisory capacity with the Lake Erie Bituminous Coal Exchange and as a result of their efforts the vessel supply for handling coal has been 100 per cent at all times. The members of this committee will be charged with the important duty of properly gaging the relative importance of the needs of the iron and steel industry in securing iron ore, the industries of the northwest in securing coal, and the food requirements of this country and its European allies. The ore, coal and grain consuming districts will require every ton of cargo that the lake fleet can move during the remainder of the season and careful arrangements will have to be made to meet the requirements of any one trade without disturbing the equally important necessities of the other two.

Canada Will Help

Official assurances of Canadian cooperation in speeding up the grain movement were given by F. W. Young, Lake Shippers' Clearance association, Ft. William, Ont. The question of rapid loading has been taken up by Canadian authorities and Mr. Young promised excellent dispatch this fall from the Canadian ports at the head of the lakes. He pointed out that the grain promises to be of good quality, thus insuring easy running when being loaded. He emphasized the importance of not loading at the head of the lakes for Buffalo delivery when that port was congested.

Harry Coulby, president of the Pittsburgh Steamship Co., Cleveland, gave Mr. Barnes assurance of the vessel owners' desire to assist the government. He pointed out that the country's industries, as well as the nation itself, were not prepared for war and had to be organized for that purpose. As an illustration he called attention to the fact that the coal requirements of the northwest had been tentatively set at 26,000,000 tons, but when war forced a close study, it was found that 30,000,000 tons were needed. The ore requirements were thought to be about 56,000,000 tons, but it was found that 68,000,000 tons had been sold. The work of the various committees which have been determining ore requirements and which are now directing railroad shipments and boat movements, was complimented by Mr. Coulby. In connection with the grain movement, he urged that attention be given to three problems: overruns and shortages; fuel supply at Buffalo for the grain boats, and holding down the number of boats in the Lake Michigan coal and grain trades.

Other speakers included: James Stewart, of the Canadian board of grain supervisors; H. S. Wilkinson, Roy Wolvin, Charles Hutchinson, W. J. Connors, C. D. Dyer, A. W. Thomson, J. J. Boland, W. H. Smith, Arthur Sullivan, Charles O. Jenkins, Herbert K. Oakes, J. E. McAlpine, A. T. Kinney, John T. Kelly, George Steinbrenner, W. D. Becker, Gordon B. Housman, Ralph Mitchell, C. W. Bryson, Charles W. Kennedy and G. A. Tomlinson.

The members of the committee of vessel owners which conferred with Mr. Barnes on the rate question included H. S. Wilkinson, Syracuse, N. Y., chairman; C. D. Dyer, Pittsburgh; G. A. Tomlinson, Duluth; J. J. Boland, Buffalo; H. K. Oakes, A. W. Thomson and Charles O. Jenkins, Cleveland.

Lieut. Merrill, U. S. N., in pointing out the need for junior officers to man merchant ships, stated that the submarine problem is a cargo problem. The American army could only exert as important an influence on the European battlefield as its lines of supply would permit. A ship manned by trained officers was almost submarine proof, provided it had a speed of more than 8 knots an hour. The need is for watch officers and the government hopes to secure 500 to 600 from the lakes, 200 of these within a short time. Lake vessel owners have offered to make room for cadets from the naval reserve aboard the boats this fall and the plans are being worked out to train these men.

The members of the Lake Carriers' association voted to authorize a committee, appointed by President Livingstone, who presided, to take up the question of wage adjustments after Oct. 1. This committee included Harry Coulby, chairman; J. S. Ashley, Capt. C. L. Hutchinson and H. S. Wilkinson.

The new wage scale is shown in an accompanying box.

New Bill of Lading

The association members also approved a new grain bill of lading drawn up by Harvey D. Goulder, counsel, and approved by Mr. Barnes. This bill of lading frees the carrier of any responsibility for shortages and prohibits any claim for overruns. The carrier will allow a fixed amount of ¼ bushel per thousand as tare. The new bill of lading is presented in full in an accompanying box.

Lake Wage Scale

The following schedule of minimum rates of wages is recommended for all vessels in the membership of the Lake Carriers' association, effective Oct. 1, 1917, and continuing until the close of navigation:

Boatswain	$ 95.00
Cooks, vessels over 4000 gross tons	125.00
Cooks, vessels under 4000 gross tons	110.00
Second cooks	65.00
Porters	57.50
Firemen, oilers and watertender	85.00
Wheelsmen-Lookoutsmen	85.00
Ordinary seamen	57.50
Coal passers	55.00

BARGES

Mates on barges not less than $10 per month more than seamen on the same vessel; and donkey men $5 per month more than seamen.

Mates' wages on tow barges of the large class, $105 per month.

Able-bodied seamen on tow barges $85 per month.

Engineers on tow barges carrying towing machines $105 per month.

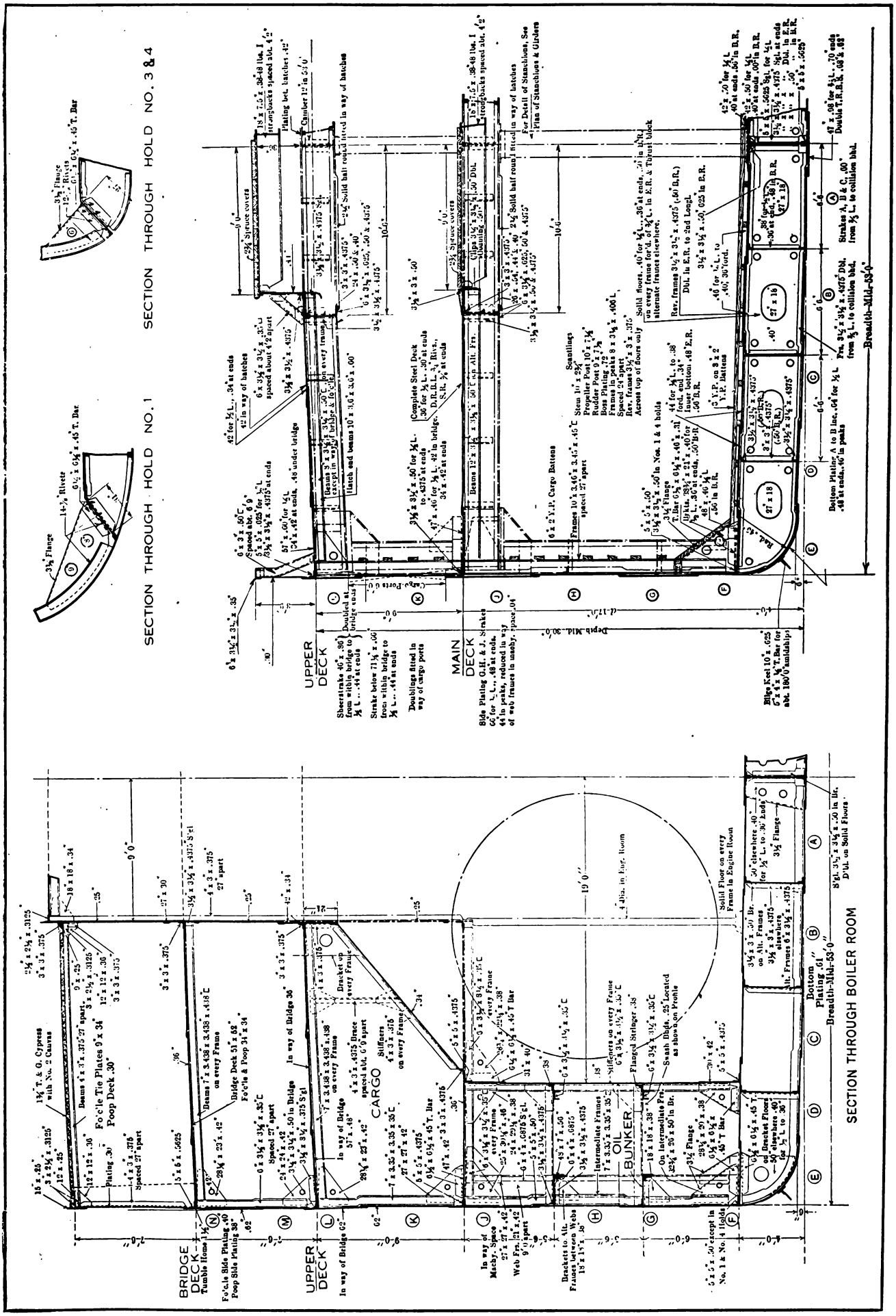
Cooks on tow barges the same wages as the seamen on the same barges.

Ordinary seamen on barges $57.50 per month.

Shipping Board Opens Office on Lakes

The shipping board is investigating the possibility of taking a large number of lake boats to the coast this fall. The number available is between 75 and 125, depending upon whether a number of small wooden steamers are definitely requisitioned. A number of small bulk freighters probably will be sent down the St. Lawrence. Many of the boats will have to be cut in two, and lake yards will be busy with this class of work toward the close of the season.

The shipping board is now maintaining offices in Cleveland. Henry Penton, naval architect, is district officer in charge of the lakes and will have general supervision over vessels now under construction and which the Emergency Fleet corporation has commandeered. Capt. R. W. England is assisting Mr. Penton. He was for many years master of steamers of the Becker fleet. F. A. Eustis is representing the shipping board itself.



STANDARD STEEL STEAMSHIP FOR THE SHIPPING BOARD SHOWING SECTION THROUGH BOILER ROOM AND MIDSHIP SECTION

Specifications for U. S. Steel Ship

Complete Description of the Hull and Propelling Machinery Requirements of the Standard 7300-Ton Steel Steamer Approved by the Shipping Board Emergency Fleet Corp.

THE following specifications are for the construction of a single-screw steel steamship of the standard type approved by the shipping board. This steamer has a deadweight capacity of 7300 tons, with a sea speed of 11½ knots. The plans and specifications were drawn up by Theodore E. Ferris, New York. The hull specifications follow:

1. General

Bidders shall state in their proposals for the construction of these vessels the unit prices on which they have estimated for main engines, boilers, engine-room auxiliaries and deck machinery, anchors and chains, and boats and davits.

It is the spirit and intent of these specifications and the plans accompanying them to cover the construction of hull, machinery, and equipment of a two-deck steamship for the United States Shipping Board Emergency Fleet Corp., of the dimensions given herein, and fitted with machinery of the size herein specified. The general construction of the vessel, its machinery, equipment and outfit will be of the regular standard of the builders for general cargo vessels. The outfit furnished by the builders will be limited to such articles as are herein specified to be furnished by them. The builders' standard fittings will be used throughout.

Alterations or amendments to the work herein specified will be made at the owners' request, provided that no additional cost is involved thereby, and also provided that any alterations or amendments are taken in hand at such time as to avoid interference with the progress of the construction of the vessel as specified. Should any additional cost or time be involved in making proposed alterations or amendments, estimates of time and cost will be submitted to the owners for written approval before the work in question is undertaken. No extra work will be undertaken without written approval.

2. Classification

The vessel with its engines, boilers and equipment will be built under American Bureau of Shipping special survey to class A-1. All requirements of the general rules and regulations prescribed by the board of supervising inspectors of the United States steamboat-inspection service in effect at the time of signing contract will be complied with, and the vessel will be officially measured and marked for tonnage by a United States collector of customs. The builders will pay all classification and inspection fees and will furnish the vessel with classification certificates for the hull, machinery, anchors and chains, and with all certificates required by United States inspection, as covered by the contract.

3. Material

All plates and shapes entering into the construction of the vessel will be mild, open-hearth steel, tested to American Bureau of Shipping requirements. All forgings, castings, wood, or other material will be of good quality, suitable for the purposes used.

4. Principal Dimensions

Length, over all, about.....385 feet
Length, between perpendiculars.370 feet
Beam, molded..... 53 feet
Depth, molded..... 30 feet

5. General Description

The vessel will be a steel single-screw steamship with straight stem and elliptical stern, and will be schooner-rigged with two steel pole masts. There will be two decks to the hull, and a raised forecastle, long bridge, and a full poop. At the forward end of the bridge deck there will be a steel deck house containing officers' quarters, and the top of this house will be carried to the sides of the vessel to form the upper bridge deck, on which will be located a wooden pilot house. A flying bridge will be fitted at the level of the top of the pilot house. There will also be a steel deck house containing engineers' quarters, etc., built abreast the engine casing on the bridge deck. A wooden house containing a hospital and wireless room will be located on top of the latter house. Steel engine and boiler casings will be carried to the level of the top of the deck house.

The vessel will have a complete double bottom subdivided into five compartments longitudinally. The compartments under the machinery space and under holds Nos. 1, 2 and 3, will be arranged for fuel oil, and the compartments under No. 4 hold will be arranged for feed water.

There will be six watertight bulkheads, four of which will extend to the upper deck and two to the main deck. There will be five cargo hatches in the upper and main decks, and one cargo hatch in the bridge deck. There will also be a hatch in the poop deck and one under it in the upper deck to the after peak. Steel plate and angle foundations for guns will be built for one gun on forecastle deck and one gun on poop deck in accordance with plans to be furnished by owners. Four cargo ports will be fitted on each side of the vessel between the upper and main decks.

The machinery will be located amidships with two main boilers abreast and a screen bulkhead built around them at their after end to separate the boiler and engine rooms. Side bunkers for fuel oil will be fitted below the main deck in the engine and boiler rooms, in addition to the double bottom compartments heretofore indicated.

Accommodation for the captain, deck officers, engineers, etc., will be provided in the deck houses on the bridge. The quartermasters, boatswain, mess boys, seamen and firemen will be berthed in the forecastle. Quarters for gun crew with wash room will be provided in the poop.

The cargo handling gear for each of hatches Nos. 1, 4 and 5 will consist of three wooden booms of 5 tons capacity each, and two single-drum, single-geared winches. For hatch No. 2 there will be three wooden booms of 5 tons capacity each, one steel boom of 30 tons capacity, and two single-drum, compound geared winches. For hatch No. 3 there will be two booms of 1½ tons capacity each and two single-drum, single-geared winches.

The vessel will have an electric lighting plant, refrigerating plant, steam heating system, steam steering gear, steam windlass, and steam capstan, all as specified hereinafter.

6. Plans

Plans from which this vessel will be built will be supplied by the United States Shipping Board Emergency Fleet Corp., as furnished by Theodore E. Ferris, the owners' naval architect and consulting engineer, also owner's representatives, except when other person may be designated by owners. Plans will consist of general arrangement of decks, lower hold, inboard profile, together with lines for lofting the vessel and midship, construction section. These plans will be known as contract plans. All drawings necessary during the progress of construction, including material schedules for hull, etc., details of stern frame, stem, rudder, engine and other foundations, deck plating plans, shell expansion, outline drawings of engine and general sizes, plan of machinery and piping, ballast and drainage, heating, plumbing, sanitary system, steering gear, masts, rigging, cargo gear, deck houses, winch foundations, bulkheads, casings, hatches, ports, together with all necessary detail hull plans, details for joiner work, together with detail plans of main engine, auxiliaries, boilers, shafting, etc., all as required to properly execute the building of this vessel, may be prepared by builders and submitted for approval of the owner's representative and classification society, or they will be supplied by the owners to the builders if the latter so requires. Any modification to the contract plans must only be made after same has been agreed to by the owners' representative. Changes in builder's approved plans and specifications will not be permitted unless approved in writing by the owners. Builder's standards as to patterns and designs of details shall be used as far as practicable.

On completion of the vessel, to be put aboard, blue prints of docking plan, 1/16-inch scale general arrangement plan with capacities and displacement scale, and a pumping plan, the two latter framed.

7. Trials

Before delivery of the vessel the propelling machinery will be given a thorough trial at the dock to insure accuracy of alignment and smooth running of the different parts. All hull auxiliaries will also be tested to

insure their being in good working order. Each vessel to be capable of maintaining an average speed at sea of 11½ knots when loaded with a total deadweight of 7300 long tons. For the first, or one vessel, a standardization trial will be held over a course mutually agreed upon in order to determine the curve of speed and revolutions, and the mean speed at sea to be based on the average revolutions of the main shaft over a period of 24 hours, according to the standardization curve. The total deadweight for the trials to be furnished and loaded by the owners.

8. Delivery

The vessel will be delivered to the owners at the yard of the builders. The adjusting of the compasses will be done after delivery, the fees therefore to be paid by builders.

9. Water Testing of Compartments

All compartments of the double bottom and the fore and after peaks will be tested with a head of water in accordance with the classification rules.

10. Steel Hull

The vessel will be built on the transverse system, with two steel decks to the hull. The decks will be supported by girders and deep beams, with one row of wide-spaced pillars. The side frames will be cut and bracketed at the main deck in way of the bunkers, so that the lower bunkers may be made oiltight. All scantlings will be as indicated on "midship section".

11. Stem

The stem will be a flat steel bar, without rabbet, and with the forward edges slightly rounded. It will be made in sections, with two scarphs, and the lower ends will be fitted with bearding angles for connection to the flat plate keel.

12. Stern Frame

The stern frame will be of cast steel, in one piece, with a narrow aperture for the propeller and with six gudgeons cast on.

13. Keel

Keel will be a flat plate with double butt straps for three-fifths length and single butt straps at the ends.

14. Vertical Keel

Vertical keel will be continuous from peak to peak, oiltight in the compartments under the machinery space and Nos. 1, 2 and 3 holds, and watertight in No. 4 hold. It will have lapped butts throughout.

15. Double Bottom

Double bottom will be fitted from collision bulkhead to a well forward of afterpeak, divided into five compartments forward and aft by oiltight floors. The compartments under the machinery space and Nos. 1, 2 and 3 holds will be used for oil fuel, and the seams will be double riveted, except under Nos. 1 and 4 holds. Expansion trunks will be fitted only for the compartments under the machinery space. In the forward hold and in the two afterholds a margin will be fitted practically normal to the frame line to obtain good rivet connection; elsewhere the tank top will be carried straight out to shell.

16. Shell Plating

The shell plating will be of scantlings, as approved by American Bureau of Shipping, and will be fitted with lapped butts throughout, except the bilge strake, which will have butt straps. A half-round molding will be fitted around the gunwale at the forecastle and poop; also at the cut-downs at the ends of the forecastle bridge and poop.

17. Bulwarks

Steel bulwarks 3 feet 9 inches high will be fitted between the forecastle and bridge and between the bridge and poop. These bulwarks will be fitted with a 6-inch channel rail at the top, and will be supported by bulb angle braces spaced about 6 feet 9 inches apart. The heel of the bulwark channel will be chipped to avoid chafing the ropes. Freeing ports with half-rounds on the edges and bars across the openings, but without shutters, will be fitted in the bulwarks, as required by American Bureau of Shipping rules.

18. Steel Decks

Complete steel decks will be fitted on the main and upper decks, bridge, and poop, and stringers and tie plates on the forecastle. The main deck will be carried through in way of the machinery casings and will be oiltight over the bunkers.

Caulked wood deck, as specified elsewhere, will be fitted on the forecastle deck. A 10-inch waterway will be fitted at the side of the forecastle.

19. Hatches

Cargo hatch coamings on the upper deck will be 36 inches high, stiffened in accordance with plan. The coamings on bridge deck will be 18 inches high. Main deck hatches will be fitted with low coamings and an angle ledge to take wooden hatch covers. Portable hatch beams will be fitted athwartship into drop-forged sockets. Wooden brows covered with steel will be fitted at main deck hatch angles. Hatch cleats, battens, and locking bars will be fitted as necessary for battening down tarpaulins on upper and bridge deck hatches. A 2½-inch half-round will be fitted on girders and web beams in way of hatches.

20. Bilge Keels

Bilge keels consisting of a 10-inch by 25-pound plate with a T-bar connection to the shell will be fitted for about 180 feet amidships.

21. Bulkheads

All watertight bulkheads will be fitted with single bounding bars and will be plated and stiffened as required by American Bureau of Shipping. The bulkheads between Nos. 1 and 2 holds and between Nos. 3 and 4 holds will extend only to the main deck; the others will extend to the upper deck.

22. Miscellaneous Steel Bulkheads

Steel bulkheads will be fitted at the forward and after ends of the bridge, at the forward end of the poop, and around the quarters in the forecastle.

The galley and crew's mess room inclosures will be steel, as will also be all bulkheads inclosing quarters in the forecastle.

23. Chain Locker

A chain locker of sufficient size to stow the cables will be fitted where indicated on plans. It will be bounded by watertight bulkheads and will have a bulkhead at the center dividing the locker into two parts. Steel chain pipes will be fitted between the windlass and chain locker. The end of each anchor chain will be strongly secured to hull in chain locker.

24. Oil Bunkers

Side bunkers will be fitted in the engine and boiler rooms as indicated on plans. The lower bunkers will be constructed as indicated on "midship section" and the riveting therein will be oiltight. Diaphragms will be fitted as necessary. Cofferdam angle 5 by 3½ inches by 10.4 pounds will be fitted on the tank top around the bunker bulkheads.

25. Engine and Boiler Casings

Engine and boiler casings of steel will extend from the main deck to the top of the bridge deck house. The top of the boiler casing will be plated over and openings provided for the escape of hot air from the fire room. A steel skylight, as specified elsewhere, will be fitted in the top of the engine casing.

26. Shaft Alley

There will be a watertight recess in the after engine-room bulkhead for the thrust bearing and a watertight tunnel from the recess to the after peak. A horizontal sliding watertight door will be fitted at the entrance to the shaft alley. The latter will be widened at the after end to provide stowage for a spare tail shaft, and bolted plate fitted to facilitate removal of shafting. Scantlings will be in accordance with American Bureau of Shipping rules, with stiffeners on the inside and plating increased under hatches. No sheathing will be fitted.

27. Miscellaneous Foundation

Substantial steel foundation will be provided for all propelling and deck machinery. Those for the main engine and thrust bearing will be built above the tank top, with longitudinal girders well stiffened transversely and extra girders fitted in the inner bottom inway thereof. The crank pit will be made oiltight.

The boilers will be carried on fore and aft saddles.

The deck in way of all machinery, hawse pipes, etc., will be well stiffened with steel framing underneath and stanchions fitted where necessary. Steel foundations for the winches will be fitted above deck.

Steel foundations for one gun on forecastle deck and one gun on poop deck will be provided in accordance with owner's plans.

28. Masts

There will be two steel pole masts with wood topmasts of lengths as shown on the plan. Each mast will have a table with fittings for cargo booms, suitable stretchers at hounds, and all necessary bands, etc., for attachment of the standing and running rigging. Masts will be stepped on the main deck. Crow's nest will be fitted.

29. Derrick Posts

There will be two steel derrick posts stepped on the upper deck and provided with all necessary bands and fittings for one cargo boom each. The posts will be fitted with mushroom tops to act as ventilators to the 'tween-deck space.

30. Cargo Booms

On the table at the foremast there will be fitted three wooden booms on the forward side and three wooden booms on the after side, with two sockets for the third boom. On the table at the mainmast there will be three wooden booms on the forward side and three on the after side. There will also be one wooden boom fitted to each derrick post.

All booms on masts will be of 5 tons capacity each and those on derrick posts 1½ tons capacity. The lengths will be as indicated on plan.

On the deck at the after side of the foremast a 30-ton steel boom, 54 feet long, will be stepped in a pedestal.

All booms will be fitted with necessary bands, etc., for attachment of rigging.

31. Fresh-Water Tanks

A fresh-water tank of 8000 gallons capacity, with two compartments, will be located in the lower engine room and will be fitted with all necessary filling and air pipes and with necessary suctions.

32. Ventilators

Four 24-inch ventilators will be fitted to the engine room, and two 42-inch ventilators to the boiler room, with turning gear for the cowls. The quarters in the deck houses and forecastle will be ventilated by 8-inch ventilators arranged so that the cowls can be unshipped and storm covers substituted.

The cargo space will be ventilated by sixteen 24-inch ventilators having cowl openings 12 feet above upper deck and arranged in the usual manner for ventilating both 'tween-deck space and holds. One 24-inch ventilator will be fitted to the shaft alley and arranged to act as a means of escape therefrom. Two 10-inch ventilators will be fitted in the poop for the cargo space, and one 15-inch ventilator for the steering-gear space. Wooden plugs and canvas covers will be provided for the carbo hold ventilators for use when cowls are unshipped.

33. Cargo Ports

Four cargo ports, with clear opening about 7 feet 8 inches by 5 feet 8 inches, will be fitted on each side of the vessel. These ports will be fitted with watertight doors each formed of two pieces, with the lower half hinged so as to drop and the upper half hinged to raise.

Web frames, with half-round face bars, will be fitted at each side of cargo ports in 'tween decks.

34. Metal Doors

A horizontal sliding watertight door will be fitted at the entrance to the shaft alley. Hinged watertight doors will be fitted in the bulkhead at the forward end of the bridge. Hinged watertight doors about 6 by 6 feet will also be fitted in 'tween decks in the bulkheads at the ends of the machinery space. Weather-tight doors will be fitted at the after end of the bridge, in the poop, in the fidley, and at fore end of passages in deck house. Nonwatertight doors will be fitted to lamp room, after end of deck-house passages, galley, and to engine casing. Wire-mesh doors will also be fitted to galley and storeroom on the inside.

35. Scuttles and Manholes

Manholes will be fitted in the tank top where necessary for access to the double bottom and also in bunkers. Raised watertight manholes will be fitted to the fore and after peaks. An 18-inch flush watertight scuttle will be fitted in the upper deck for access to the chain locker. Raised watertight manholes will be fitted in the upper and main decks in the vicinity of the masts, as indicated on plan, for access to 'tween decks and lower holds.

36. Booby Hatch

A steel companion hatch with a watertight door will be fitted on the poop deck for access to the steering-gears space.

37. Metal Hatch Cover

The hatch in the upper deck over the after peak will be fitted with a steel hinged watertight cover.

38. Fidley Covers and Gratings

The top of the fidley will have openings provided with metal gratings for the escape of hot air from the fireroom. These openings will be fitted with hinged covers without fixed lights.

39. Engine-Room Skylight

Over the engine room there will be a steel skylight with ventilating shutters, exhaust ventilators, and with glass sash. The skylight will be bolted to the top of the engine casing and will be fitted with ring bolts for lifting. The shutters will be fitted with lifting gear for opening from the upper engine-room grating. Skylight will be made practically watertight.

40. Metal Ladders

Suitable ladders, or ladder rounds, will be provided for access to the fore and after peaks, bunkers, and for access to the holds under manholes in decks. No ladders will be fitted at hatch ends. Metal ladders with galvanized-iron handrails will be provided for access to the bridge, poop, and forecastle decks where shown on plan; these ladders will be made nearly vertical. A similar ladder will be provided in the companion on the poop for access to steering gear. Ladder rounds will be fitted to each mast.

41. Hawse Pipes

Cast-iron hawse pipes suitable for stockless anchors will be fitted. Steel plate covers will be fitted to hawse pipes.

42. Bitts and Chocks

Bitts and chocks of builders' standard patterns will be fitted as listed below. Doubling plates, instead of wood, will be fitted under bitts.

On the forecastle deck:
- Two 12-inch and two 9-inch bitts.
- Two 5½-inch roller chocks.
- Two 18 x 12-inch mooring rings.
- Two pedestal fair-leaders.
- Two 4-inch fair-leaders.

In the forward well:
- Four 9-inch bitts.
- Four 14 x 8-inch mooring rings.

On the bridge deck:
- Four 6-inch bitts.
- Four 10 x 4-inch chocks.

In the after well:
- Four 9-inch bitts.
- Four 14 x 8-inch mooring rings.

On the poop deck:
- Two 12-inch and two 9-inch bitts.
- Two 5½-inch roller chocks.
- Two mooring chocks.
- One stern chock.
- Two 4-inch fair-leaders.

Chocks on forecastle head, bridge, and poop decks to be combination open and closed chocks to meet Panama canal requirements.

43. Cargo Lashings

For securing deck loads there will be furnished 16 lashings, of sufficient length to extend from bulwark to bulwark across the top of a deck load about 10 feet high. Each lashing will consist of 3-inch circular galvanized-wire rope with necessary links, thimbles, shackles, and manila-rope lashing. Suitable pad eyes will be riveted to the bulwark rail to take the lashings.

44. Boat Davits

The lifeboats will be stowed on top of the engineers' deck house and will be handled by approved mechanical davits, which will meet the recommendation of the United States steamboat-inspection service. The working boat will be stowed on the upper bridge deck and will be handled by a pair of davits of the rotating type, which will heel on the bridge deck.

45. Rail Stanchions

Forged stanchions with two wrought iron pipe rails will be fitted around the forecastle, bridge and poop decks, the upper bridge deck, and the flying bridge. The top rails will be 1-inch diameter and the lower rails ¾-inch diameter. Similar rails will be fitted on top of the after deck house. On the flying bridge the rails within 12-foot radius of the compass will be brass. On the bridge deck portable rails will be fitted in way of the hatch and side ladder landings, and elsewhere as required. The top rail in all cases will not be more than 39 inches above the deck. All rails and stanchions will be galvanized. Portable stanchions, with chain rails, will be fitted around between deck hatches.

46. Awning Stanchions

Galvanized-iron pipe awning stanchions will be fitted for the awnings on the forecastle deck, poop deck, upper bridge deck, and flying bridge. Jack rods, ridge bars, etc., will be fitted as necessary.

47. Accommodation Ladder

One accommodation ladder of oak will be provided and arranged so that it may be shipped on either side of the vessel. A davit will be fitted for handling the ladder.

48. Air Ports

Brass-framed air ports will be fitted where shown on plans. The air ports in the forecastle and poop will be 10 inches diameter, with cast iron covers

on all air ports in shell plating.

In the bridge and deck houses all air ports, except those in the dining saloon, will be 12 inches diameter without shutters. The air ports in the dining saloon will be 14 inches diameter without shutters.

49. Deck Scuppers and Drains

Galvanized-iron pipe scuppers will be fitted for draining the forecastle, bridge, and poop decks, top of bridge deck houses, upper bridge deck, flying bridge, windlass bed, and such floor spaces as require special drains. In general these scuppers will drain overboard, excepting that those for the erections above the bridge will drain to the deck below. Pipe scuppers will have strainers fitted of standard pattern. The main deck will have galvanized pipe scuppers draining to bilge.

The scuppers for the upper deck will be cut in the stringer bar which will be properly reinforced for the openings cut.

Brass drain plugs will be fitted in the peaks and in each compartment of the double bottom for use when the vessel is in dry dock.

50. Sinks and Hand Pumps

A galvanized-iron sink will be provided in the galley and a sheet-lead sink in the pantry, each with connection from gravity fresh-water tank.

51. Rudder

The rudder will be of the single-plate type with a cast-steel frame having arms opposite each pintle and connected to a separate forged-steel rudder stock through a horizontal flanged coupling by six body-bound bolts. The rudder plate will be of required thickness. There will be six steel pintles, 5 inches diameter, with composition casings working in lignum-vitae bushings in the gudgeons. The rudder stock will be 10 inches diameter and will extend above the upper deck to suit the steering gear. The weight of the rudder will be supported by a heavy cast-iron collar in halves working on a flat brass bearing ring, the latter fitted in a cast-iron bearing on the upper deck at the top of the rudder trunk. The bearing will be made in halves and will be lined with white metal.

52. Cement

The bottom of the vessel, except in fuel-oil compartments, will be well coated with Portland cement covering all the rivet heads and dished up over the frames, the cement being carried well up the turn of the bilge. The tank top in the boiler room will be covered with cement about 2 inches thick. At the ends of the vessel all the inaccessible places will be filled in with cement so as to give a free flow of water to the limber holes. The fresh-water tanks and all double-bottom compartments not used for fuel oil will be given two coats of cement wash. All cement will be composed of one part of Portland cement and two parts of sharp sand.

53. Wood Decks

Yellow-pine calked deck 3 inches thick will be laid on the forecastle deck only.

54. Ceiling and Sparring

Yellow-pine ceiling, 3 inches thick, will be laid athwartship on battens throughout the cargo hold. Similar ceiling will be laid fore and aft on the bilge brackets and fitted with portable sections to give access to bilges.

Cargo battens will be fitted in cleats at the sides of the vessel, in the hold, and between decks and the bridge and poop. Sparring will also be fitted on the cargo side of such portions of the bulkheads at the ends of the machinery space as form part of the oil bunkers. A portable slat bulkhead will be fitted around the steering-gear space in the poop.

55. Miscellaneous Carpenter Work

The cargo hatches and the hatch to the storeroom forward will have covers of 2¾-inch spruce fitted with lifting rings and suitably marked. Wooden boxing, or steel where more suitable, will be fitted for bilge, air, and sounding pipes where necessary in the cargo holds. Under the windlass there will be a separate foundation of 4-inch yellow pine. Suitable wooden brows faced with steel will be fitted at all cargo ports, at the bulkhead doors in between decks, and at between deck hatches. Slat gratings will be fitted forward and aft for stowage of lines. Necessary shelves, etc., will be fitted for boatswain's and general ship stores.

56. Joiner Decks

The upper bridge deck will be 1¾-inch tongued and grooved cypress laid on beam caps fitted in the bosoms of the angle beams and covered with No. 2 canvas. A similar deck covered with No. 2 canvas will be laid on the top of the afterdeck house. The tops of the wheel house and wireless house and the flying bridge will have 1¾-inch tongued and grooved cypress deck laid on 4 x 3-inch yellow-pine carlins and covered with No. 2 canvas. No felt will be fitted under the canvas in way of these decks.

57. Joiner Work—General

In the forecastle, the inside bulkheads around the staterooms will be of steel. The seats and drop leaf desks in these rooms will be ash. No ceiling will be fitted at the sides of the vessel in these quarters. The doors to the living quarters will be wood.

In the bridge deck houses, the bulkheads inclosing the staterooms, etc., will be plain tongued-and-grooved oak, and the sides of the houses will be ceiled in all staterooms, saloon, and officers' mess room. The sides of the houses in way of bathrooms, pantry, and storerooms will not be ceiled. The dining saloon will be finished in plain tongued-and-grooved oak wainscoting with oak paneling above. The beams in the dining saloon, officers' mess room, and in deck house staterooms, will be incased with cypress.

Built-in berths, lockers, etc., in the captain's spare, officers', engineers', and steward's rooms will be plain oak. In the oilers' and cook's rooms all wood furniture will be ash. Slat doors with copper netting will be fitted in chart room, first officer's room, wireless, hospital, and to all staterooms and mess rooms in afterdeck house. Screen doors will be fitted in the galley and at the passages in the forward deck house. Window or air port screens of copper-wire mesh will be fitted in all spaces protected by screen doors.

The wheelhouse and wireless house will be built of wood with yellow-pine sill, studding and plates, sheathed with cypress and the wheelhouse ceiled with oak. Windows with drop sash will be fitted in this house.

The front and forward sides of the upper bridge deck will be inclosed with tongued-and-grooved yellow pine to the rail height and capped with 5 x 2½-inch yellow-pine rail.

58. Miscellaneous Joiner Work

Hinged wood covers with glass sash will be fitted over the skylights to galley and crew's mess rooms. Ash ladders 24 inches wide, with galvanized iron handrails, will be fitted on each side for access to the upper bridge deck, top of after deck house, and to the flying bridge. All necessary dish racks, dressers, etc., will be fitted in the pantry, and dressers in the galley; all dressers will have ash tops covered with lead. Shelving and bins will be fitted in the steward's and other storerooms, as required. Hardware, name plates, etc., will be of the same class as that fitted by the builders on general cargo vessels. Built-in berths, seats, etc., will be fitted as specified under "Furniture". Frames for notices and licenses will be supplied as required. Bucket racks and other miscellaneous joiner work will be fitted as on general cargo vessels.

59. Refrigerating Room

The refrigerating room will be built as follows:

Walls and Ceiling.—One thickness of ⅞-inch tongued-and-grooved yellow pine, one layer of waterproof paper, two thicknesses of 2-inch cork with waterproof between the layers, one layer of waterproof paper, and one thickness of ⅞-inch spruce.

Floor.—Bituminous composition on deck, one layer of waterproof paper, one layer 2-inch cork, one layer ⅞-inch tongued-and-grooved yellow pine, one layer of waterproof paper, one layer 2-inch cork with a layer of waterproof paper and a layer of ⅞-inch tongued-and-grooved spruce.

The floor will be covered with 5-pound lead flashed 12 inches up on the sides and covered with ash gratings. No other metal lining will be fitted. Necessary metal shelves, bars and meat hooks will be provided.

Partition.—One thickness of ⅞-inch tongued-and-grooved spruce, one layer of waterproof paper, 2-inch cork, one layer of waterproof paper, and one thickness of ⅞-inch tongued-and-grooved spruce.

60. Painting

The steel hull will be given one priming coat inside and outside during construction. In addition, the interior of the vessel will be given one coat of red lead and the outside above the water line one coat of red lead and one coat of an approved finishing color. (This water line is a line at a draft of about 19 feet forward and 21 feet aft. There will be no boot-top paint, and the war color top-sides paint will be carried down to this line.) Below the water line the outside of the vessel will be given one coat of approved anticorrosive and one coat of ap-

proved antifouling paint, which coats will be applied while the vessel is in dock previous to delivery. The deck work and inside of bulwarks will be given two coats of an approved color. All hardwood will be finished in natural color, and all other woodwork in quarters will be given two coats of an approved color. All exposed steelwork in living quarters will be cork painted. All steelwork in way of refrigerating rooms will be painted with approved bituminous paint. The tank top in engine room, engine foundations, pump wells, bulkheads in cargo spaces to 18 inches above tank top, ship's side, at bilge to 9 inches above margin brackets, and the entire internal surface of chain locker will have one coat each of approved bituminous solution and enamel. The tank top in cargo spaces will be coated with native tar and cement before ceiling is laid. The inside of the double-bottom compartments not used for fuel oil will be given two coats of cement wash. The vessel's name will be painted on boats, buckets and life buoys. The name will be painted on both sides of the bow, and the steel blocks as used on cargo vessels will be furnished for wire rope.

All necessary sheer poles, pad eyes, cleats, etc., will be fitted as customary in this type of vessel.

There will be no provision made for sails.

62. Awnings

Awnings of No. 3 canvas will be fitted as follows:

One over flying bridge.

One at side of house on upper bridge deck.

One over forecastle deck.

One over poop deck.

63. Miscellaneous Canvas Work

The following will be supplied:

Two sets tarpaulins for each cargo hatch exposed to weather (one set waterproof).

One set tarpaulins for hatch under bridge.

Double mast coats for each mast.

One set bridge cloths.

Two binnacle covers.

One cover for galley skylight.

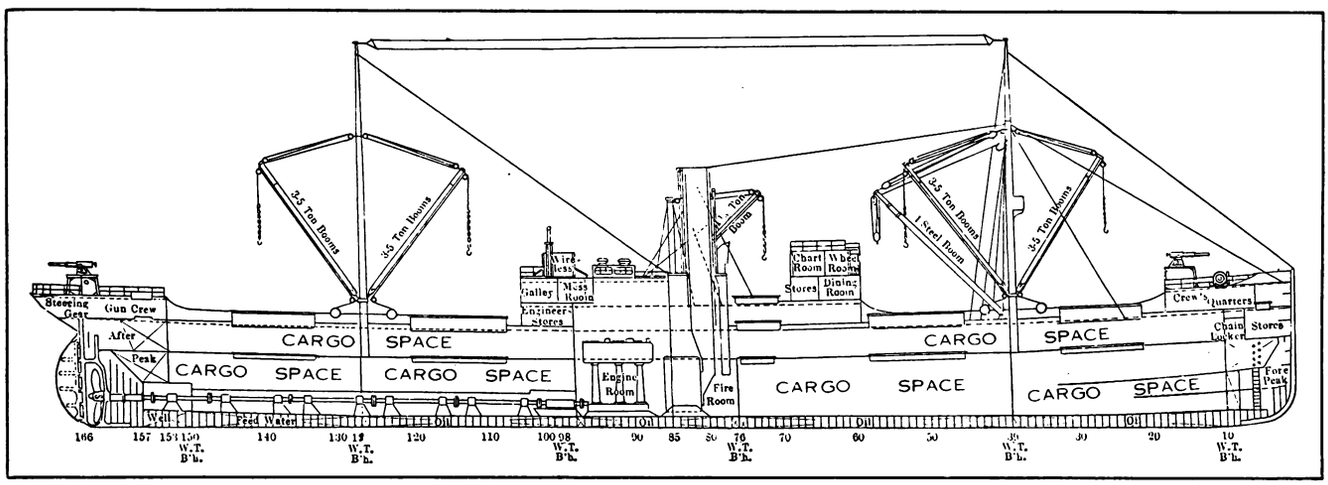
One cover for mess-room skylight.

Two wheel covers.

Propelling Machinery

(Propelling machinery will be built in accordance with American Bureau of Shipping rules and United States inspection laws.)

The machinery will consist of two single-ended return-tube Scotch boilers, or water tube boilers of approved type and size, and one vertical inverted three-cylinder triple-expansion engine, with cylinders 24½ by 41½ inches and 72 inches diameter by 48-inch stroke, or a geared turbine of equivalent power. The auxiliary machinery will consist of one main surface condenser independent of the engine framing, one centrifugal circulating pump with independent single-cylinder engine, one direct connected air pump, two direct connected bilge pumps, two direct connected feed pumps, one direct connected evaporator feed pump, one independent fire and donkey pump, one ballast pump, one donkey feed pump, one auxiliary condenser, one feed-water heater, injectors, and other machinery as described in the following specifications.



PROFILE OF GOVERNMENT'S STANDARD STEEL STEAMER

name and port of registry on the stern, all letters being outlined by a chisel. Draft marks on the stem and sternpost will be outlined by a chisel and painted.

61. Rigging

The foremast will have a headstay and three shrouds on each side. The mainmast will have two shrouds on each side. A headstay and backstays will be fitted for each topmast. A signal stay will be fitted between the foremast and stack. Preventer stays will be fitted on each side of foremast in connection with the 30-ton boom. All standing rigging will be galvanized steel wire rope and will be set up by turnbuckles. The stays will be served at ends only, but the shrouds will be served all over. The shrouds will not be fitted with ratlines.

For all the cargo booms durable wire rope will be fitted for topping lifts. The vangs for all booms will have galvanized steel wire pendants and manila falls with wood blocks. The hoisting rope for all booms will be durable wire rope. Short lengths of wrought-iron chain will be fitted between cargo hooks and hoisting rope. A standard make of galvanized

Covers for boats.

Covers for cargo-hold ventilator trunks.

64. Miscellaneous Floor Coverings, Etc.

The galley floor will be of brick set in cement. The floors of all bathrooms will be ceramic tiling set in cement. Plain linoleum 3/16-inch thick will be laid on the deck in all mess rooms, staterooms, chart room, wheelhouse, wireless room and hospital, pantry, passages in forward deck house, and in seamen's and firemen's quarters. In such of the above spaces as have a steel deck the latter will be covered with cement 1 inch thick under the linoleum. The deck in petty officer's and crew's toilets will be cemented. The floor in the ice house will be covered with 5-pound sheet lead, which will be flashed up on the sides 12 inches and the whole covered by ash gratings. The sills of all outside joiner doors will be covered with sheet brass. Dresser tops in galley and pantry will be covered with sheet lead. Oak wearing strips will be fitted on wood decks at all outside doors and ladders. Ash gratings will be provided for the wheelhouse floor.

The operating platform will be located on the starboard side, and the reversing gear, throttle gear, cylinder drains, etc., will be located at this point. The engine telegraphs, speaking tubes, gauges, and counters will be located near the operating platform.

The arrangement of the cylinders, beginning forward, will be high pressure, intermediate pressure, and low pressure, with the valves in each case located forward of the cylinder. The cylinders will be accurately bolted together and provided with flanges for bolting to the housings.

The boilers will be arranged in one fireroom with furnaces fore and aft. The Scotch boilers will be of the single-ended type, with four furnaces in each boiler, and designed for a working steam pressure of 190 pounds per square inch and arranged for burning oil on an approved mechanical atomizing system.

Water tube boilers will be designed for a working steam pressure of 200 pounds.

These specifications are intended to cover substantial machinery with no unnecessary finish in any part. All wearing, running, or working parts

will be of large proportions and carefully fitted, and the entire machinery will be built in a thorough and workmanlike manner to insure the efficient and satisfactory running. The machinery installation, together with all tools, spares, and equipage, will be subject to the approval of the owners.

The cut-offs to be such that the subdivision of power between the cylinders will be approximately equal, and the distribution of weights will be such that the engine will be as nearly balanced as possible. All machinery will be strong and durable and will be designed with extra large bearing surfaces. The main engines will be strong and rigid and built to work at maximum power continuously. All necessary grating, platforms, ladders, hand rails, grab rods, thermometers, gages, working levers, revolution counters, clocks, etc., will be supplied and fitted.

Water end of all pumps except oil pump and fresh-water pump to be composition lined and fitted.

1. Cylinders

To be of cast iron. Indicator pipes fitted to top and bottom of each cylinder. The cock to be located near top of cylinder. By-pass valve with gear fitted to intermediate-pressure and low-pressure cylinders. High-pressure cylinder fitted with hard, close-grained cast-iron liner, high-pressure and intermediate-pressure fitted with piston valves, the low-pressure fitted with loose valve face, secured by brass screws. Eyebolts fitted under cylinders for lifting main bearings.

2. Lagging

The cylinders to be lagged with magnesia and covered with galvanized sheet iron secured by round-headed iron screws.

3. Cylinder Covers

To be of cast iron, strongly ribbed, with fluted top. Each cover to be fitted with starting bolts. One chain sling for lifting cylinder covers to be supplied. Eyebolts supplied for lifting cylinder covers, etc.

4. Steam-Chest Covers

Of cast iron, strongly ribbed, with fluted top. Each cover to have cast-iron dome bushed with brass to receive the top end of the valve stems. The low-pressure cover to have a balance cylinder. Starting bolts fitted to each cover.

5. Drain Cocks

To be fitted to low-pressure and intermediate-pressure cylinders and low-pressure steam chest with brass drain pipes. High-pressure cylinder and high-pressure and intermediate-pressure steam chests fitted with drain valves. All handles led to starting platform. Drain pipes led to condenser.

6. Pistons

The pistons will be of cast iron, the intermediate pressure and low pressure to be hollow in form and strongly ribbed. Eyebolts will be supplied for lifting the pistons. The pistons will be secured to the piston rods by wrought-iron nuts. The high-pressure piston will have four rings, a bull ring, and a follower. The intermediate-pressure piston packing will have two piston rings and a follower. The low-pressure piston will be fitted with one ring about 3½ inches deep, cut and fitted with a tongue piece and steel springs back of ring. Detail drawings of the pistons will be submitted to the owners for approval.

7. Main Valves

To be of cast iron of the ordinary piston and slide valve type. Passages arranged to suit ports in cylinders. The upper liner to be bored 1/16 inch larger than lower liner. Valves worked by link motion. Valves supported by large washer at bottom and secured with a clamp at top end.

8. Auxiliary Condenser

To be installed in engine room. Shell and water chest cast iron. Cooling surface, 800 square feet. The tube sheets will be brass and the tubes brass ¾-inch outside diameter, 17 B.W.G. thick, the same as the main condenser. The ballast-pump discharge will be connected up to the auxiliary condenser.

9. Throttle and Stop Valves

Bodies of cast iron, brass mounted. Throttle valve to be of the double-beat type. Throttle-valve handle and stop-valve wheel to be conveniently reached from working platform.

10. Main Condenser

To be of the independent cylindrical type. Shell and water chest cast iron. The tubes to be brass properly fitted into brass tubes sheets with screwed glands. Brass supporting plate fitted in center. Cooling surface about 3800 square feet. Condenser tubes ¾-inch outside diameter. 17 B.W.G. thick. All necessary cocks and valves for efficient working to be fitted. The circulating water connections will be 14 inches in diameter. The condenser tubes are not to be tinned.

11. Framing

The framing will consist of straight cast-iron housings of box section. Guides will be formed on the housings to suit the cross-head slippers. The guides to be fitted with water circulation.

12. Bedplate

To be of cast iron of strong box section. Recesses will be cast in bedplate to receive flat-bottom crankshaft bearings. Length of bearings about 14 inches, six in number. Bearing boxes to be cast iron carefully fitted into machined recesses provided in the bedplate, with nuts at top and bottom. Each cap to be fitted with cast-iron oil box with hinged brass lid. Bearings lined with an approved high grade white metal, standing well above the cast iron.

13. Cooling Pipes

Main water-service pipe of brass provided with swing joints. Cocks and pipes for bearings, crank pins, and eccentrics to be supplied and fitted. Brass pipe with branches to be fitted as far as aft shaft bearing, and connection to engine cooling pipe. Cooling water to be circulated through the thrust shoes.

14. Piston Rods

To be of forged steel, with wrought-iron or mild steel nut on each end for securing to the crossheads and pistons. The rods to be interchangeable. The high-pressure and intermediate-pressure stuffing boxes will be fitted with an approved metallic packing. The low-pressure stuffing box will be fitted with soft packing.

15. Crossheads

The crossheads will be forged steel with cast-iron slipper, lined with an approved high grade white metal.

16. Connecting Rods

The connecting rods will be of forged steel with the upper end forked and the lower end T-shaped. The length between centers will be 108 inches. The rods will be turned and polished. Cast-steel boxes lined with an approved high grade white metal will be fitted at top and bottom ends, with cast-iron liners for convenience in adjusting without removing bolts. The low-pressure crosshead will be made to receive the pump links. Necessary lubrication boxes and pipes will be fitted.

17. Valve Gear

The valve gear will be of the Stephenson double bar link type with cast-iron eccentrics and straps. Eccentric rods will be steel with forked upper end and T-shaped lower ends; the upper ends will be fitted with brass bushes and bolts. The valve stems will be forged steel, turned and finished bright; to be fitted with brass bushes for links at the bottom; top end to work in cast-iron dome, bushed with brass, fitted on each steam-chest cover. Adjustable guides fitted under cylinders. High-pressure and intermediate-pressure valve-stem stuffing boxes fitted with an approved metallic packing. The low-pressure valve-stem stuffing box will be fitted with soft packing. Valve stems 3⅜ inches diameter through glands. Expansion links and reversing rods to be of forged steel. All pins and eyes in the working gear to be fitted with brass bushes or boxes, finished bright all over. Eccentric sheaves held together by wrought-iron bolts, fitted on shaft and secured with keys bedded into crankshaft. Eccentric straps will be fitted with an approved high grade white metal, and top and bottom halves will be interchangeable. Cast-iron distance pieces fitted between halves of straps. Studs fitted in top half for attaching eccentric rods. Reverse shaft of forged steel with cast-steel reversing arms. Each reversing arm fitted with exapsion gear for adjusting valves.

18. Steam Reversing Gear

The reversing gear will be of the direct-acting type, actuated by a steam cylinder 14 inches diameter by 20-inch stroke. The gear will be controlled by a floating lever operated from the working platform.

19. Handling Gear

Rods and handles for working the throttle valve, drain cocks, and the reversing engine arranged to be worked from starting platform. Engraved index plate on front column for starting handles.

20. Air Pump

To be of the Edwards type, 26 inches

diameter by 21-inch stroke, and worked from the low-pressure crosshead; chamber of cast iron, brass-lined. Air pump will be attached to seats or facings on the engine framing. The rod will be of steel, cased with brass, and properly guided. The pump links will be fitted with double nuts. The air-pump rod will be fitted into the crosshead.

21. Circulating Pump

To be of the centrifugal type with cast-iron casing, brass runner, and shaft. The pump will be driven by a direct-acting single-cylinder engine, 8 inches diameter by 10-inch stroke. The pump will have 14-inch suction and discharge.

22. Feed Pumps

To be of cast iron, two in number, 4 inches diameter by 21-inch stroke, one at each end of air pump crosshead, arranged so that they can be worked independently. Rams to be of brass, pump chests of brass with brass valves and seats. A spring relief valve to be fitted and also a large air chamber. Stuffing boxes to have brass neck rings and glands fitted with brass bushings. Pet valves fitted to each pump.

23. Bilge Pumps

To be of cast iron, two in number, each fitted with ram and valves of brass. Air vessel to be fitted on discharge of each pump. Discharge pipes to be copper with valves on ship's sides. Bilge pumps to be 5 inches diameter by 21-inch stroke. One pump to be arranged to draw from sea and discharge on deck with an escape valve on the delivery pipe. Pet valves on each pump.

24. Evaporator Feed Pump

To be 1¾ inches diameter by 8-inch stroke and connected to the air-pump beams.

25. Air-Pump Crosshead

To be of steel, turned and finished bright, holes bored to receive air, feed and bilge pump rams, and worked by links from the low-pressure crosshead. Adjustable guide to be fitted on back of housing. Crosshead to be fitted to air-pump rod.

26. Pump Levers and Links

Pump levers to be double steel plates, with shaft working on separate adjustable bearings with brass boxes and steel caps. Links of steel with adjustable bushes or boxes fitted at each end and connected to engine crosshead and pump crosshead. Oil cups fitted where necessary. The links will be fitted with double nuts.

27. Relief Valves

Fitted to intermediate-pressure and low-pressure steam chests. Cast-iron bodies with valves and seats of brass.

28. Overboard Discharge Valves on Ship's Side

To have proper fittings for keeping valve open when necessary. Discharge pipe of copper.

29. Crank Shaft

Built of forged steel 14 inches diameter in three interchangeable sections with webs shrunk to pins and shafts, and with shafts keyed. Each section to work on two bearings of cast iron lined with an approved high grade white metal fitted in the bedplate. Cranks to be placed at angles of 120 degrees. To be turned and finished bright all over and coupled together with turned and fitted steel bolts and wrought-iron nuts. Shaft to have finishing cut taken off in lathe after all parts are coupled together, and then bedded accurately into main bearing.

30. Thrust Shaft

To be of forged steel, 14 inches diameter, coupled to crankshaft, turned and finished bright with 10 thrust collars. Couplings and thrust collars to be forged solid on shaft.

31. Line Shafts

To be of forged steel, 13 inches diameter, turned all over, couplings forged solid on shafts. Sheet-iron guard to be fitted over each coupling in tunnel.

32. Propeller Shaft

To be of forged steel, 14⅞ inches diameter, turned all over, and fitted with continuous brass liners; after liner carried into recess in propeller boss. The joint between the forward and after lines will be brazed. After end of shaft tapered to fit bore of propeller.

33. Thrust Bearing

Thrust bearing to be fitted with 10 horseshoe collars lined with an approved high grade white metal. There will be a bearing at each end of the thrust, lined with white metal. Collars to be arranged so that each horseshoe may be separately adjusted for wear while the engines are working. Each shoe fitted for water circulation.

34. Steady Bearings

There will be nine steady bearings of cast iron, bottom halves lined with an approved high grade white metal, adjusted to shafting and firmly bolted to casings. Covers to have boxes cast on for lubricating. Water pipe fitted along tunnel with service pipe to each bearing. Pipe to be brass, screwed.

35. Stern Tube

To be of cast iron bushed with brass at after end, fitted with lignum-vitae truly bored, and fitted with gland complete. A brass-bushed bearing will be fitted at forward end. To be secured to sternpost by wrought-iron nut outside and to bulkhead by iron bolts and nuts. Cast-iron gland, brass bushed, to be fitted at inner end.

36. Purifier

A galvanized sheet-steel oil filter or purifier of approved make of 80 gallons capacity per 24 hours will be supplied. This filter will be fitted with all necessary heater, supply, and drain pipes, drip pans, etc. A drain tank will be provided for receiving oil from filter. A small rotary-geared hand pump will be supplied for pumping out the crank pits.

37. Propeller

To be solid cast iron with four blades, about 17 feet diameter. The wheel will be secured to the tail shaft by a wrought-iron nut and feather, secured with pin and cotter key. Nut to work reverse way of propeller and to be provided with lugs for driving. One spare cast-iron propeller wheel will be furnished and stowed aboard ship.

38. Sea Injection Valve

To comply with American Bureau of Shipping regulations, fitted with suitable strainer.

39. Whistle

An 8-inch single bell chime whistle to be fitted. Exposed portion of whistle pipe to be lagged.

40. Fire and Donkey Pump

There will be one 9 x 6 x 10-inch vertical duplex steam pump for washing decks, feeding boilers, etc., piped to circulate water in auxiliary condenser, in main boilers when getting up steam, and pump from feed tanks into boilers in the event of anything going wrong with the main feed pumps; also connected to sea and reserve feed tanks and fresh-water side of main condenser.

41. Donkey Feed Pump

A 4½ x 2¾ x 4-inch horizontal duplex donkey feed pump will be fitted with suction from the feed tank and reserve feed tanks and discharge to the boilers direct. This pump to be controlled by hand or chronometer valve operated by float in feed tank.

42. Injectors

One approved injector to be installed and fitted with 2-inch suction from reserve feed and 2-inch discharge to auxiliary feed main. There will be one small injector for feeding donkey boiler.

43. Ballast Pump

A 10 x 12 x 12-inch horizontal duplex pump will be fitted for pumping out water ballast and bilges. Pump to have brass-lined cylinder and brass pump rod. Pump to discharge overboard direct through main and auxiliary condensers, to fire main, and to fore peak.

44. Fresh-Water Pump

A 4½ x 2¾ x 4-inch horizontal duplex pump will be fitted to draw from the fresh-water tank in the engine room and discharge to the 200-gallon gravity tank amidships.

45. Pipes

The following pipes to be of copper if over 2 inches diameter; those 2 inches diameter or less to be of brass, standard wrought-pipe size, except that steam and exhast pipes on deck may be of brass, standard wrought-pipe size where necessary for installation through lightening holes:

Main steam risers from boilers (elsewhere steel).

Auxiliary steam throughout.

Auxiliary exhaust outside machinery space where exposed to weather.

Escape pipe above deck.

Main injection and all overboard discharge pipes.

Feed discharge, boiler blows, and water column pipes.

Main exhaust.

Main air pump suction.

Bent portions of ballast pump discharge to main and auxiliary condenser.

Engine water service to be of brass pipe, standard wrought-pipe size.

The following pipes to be of stand-

ard wrought pipe, black:

Auxiliary exhaust, except where exposed to weather.

Escape pipes below deck.

All other pipes to be of standard wrought pipe, galvanized.

Pipes on deck to be protected with steel plate where necessary.

46. Valves

Main steam valves to be of cast steel, with monel metal or hard bronze seats.

Feed discharge valves, except on boilers, and all auxiliary steam valves 2½ inches and above to be cast iron, 2 inches and below to be brass regrinding, medium pattern, screwed ends of an approved make.

Cast-iron valves for full boiler pressure to have monel metal or hard bronze seats and those exposed to weather to be galvanized.

Feed-discharge valves on boilers, boiler blows and water columns, and feed-check valves to be of composition, flanged.

All valves on boilers to have flanged ends and bolted bonnets.

All valves in low-pressure system not otherwise noted 4-inch diameter and above to be cast iron, flanged, 3½-inch diameter and below to be brass, screwed ends.

All sea valves to be of cast iron, flanged.

Overboard discharge valves on ship's shell to be of cast iron, flanged, of weighted check type.

Reducing valves of an approved make to be installed as required.

47. Flanges

Flanges for following systems to be of forged steel:

Main steam.

Auxiliary steam, except where exposed to weather.

Feed discharge and boiler blows.

Water-column pipes.

Flanges for all other systems to be of cast iron, except that those for auxiliary exhaust where exposed to weather will be of composition, and that pipes of 1½-inch diameter and less may be joined with unions.

All pipe flanges shall be "American standard".

48. Castings

Castings in main steam to be of cast steel.

All other castings to be of cast iron; those in high-pressure system of 2-inch diameter and over being flanged and all others 6-inch diameter and below screwed.

Cast-iron fittings to be galvanized in galvanized pipes and black in black pipes.

49. Steam and Exhaust Piping to Winches, Windlass, Capstan, and Steering Engine

Steam piping will be copper or brass with brass flanges where exposed to the weather, forged steel flanges elsewhere.

The exhaust piping will be galvanized steel with cast-iron flanges, except where exposed to the weather copper or brass pipe and brass flanges will be used. The above piping will, as far as possible, be run on deck.

The piping will be arranged so that the winches can take steam from either main boiler by way of the auxiliary steam line, and will be suitably protected from damage, but will not be lagged where exposed to weather.

The valves in the steam and exhaust piping will be so arranged that any winch may be cut out independently. The windlass steam and exhaust piping will be extensions of the forward winch lines.

Capstan and steering engine steam and exhaust line will be independent of winch line and will be run through the shaft tunnel.

Deck machinery steam and exhaust lines will have cut-out valves in the engine or boiler room.

50. Steam and Vacuum Gages

There will be one steam and one intermediate, one compound, and one vacuum gage of heavy brass, to be connected and fitted above starting platform in engine room. A high-pressure gage will be fitted on each boiler in fireroom. All reducing valves will be fitted with gages. Pressure gages to be fitted to all pressure pumps as required. Recording gage will be fitted in chief engineer's room. All gages will have seamless Bourdon tubes, and those graduated to over 125 pounds will have double tubes. All gages except main engine gages will have iron bodies, brass mounted. All gages in engine room to be conveniently arranged in front of engine. Engine counter and gear to be fitted.

51. Ladders and Floor Plates

Ladders provided from deck to engine room and stokehold. Gratings fitted about engine to enable the working parts to be easily oiled. Ladders fitted where necessary. Floor plates in fireroom and engine room to be 10½-inch rolled-steel body-ribbed pattern. Handrails in engine room cold-rolled steel ⅞-inch diameter. Handrails in fireroom ¾-inch iron pipe.

52. Storeroom

The storeroom to be fitted with all requisite lockers, shelves, and racks for eyebolts, etc., with grating in front for light and ventilation.

53. Lifting Gear

Suitable gear for lifting cylinder covers and pistons with chain blocks specified elsewhere to be fitted.

54. Turning Gear

A large cast-iron wheel in halves will be securely keyed to shaft and fitted with worm gearing and operated by 8 x 6-inch steam turning engine.

55. Boilers

To be two single-ended boilers of the cylindrical type, 16 feet 6 inches outside diameter by 11 feet 6 inches long outside, each fitted with four 43-inch inside diameter Morison furnaces of the horse-collar type. Each furnace to be fitted for burning Mexican fuel oil on an approved mechanical atomizing system.

Boilers to be built to pass United States inspection requirements and to have an ample number of well-fastened zinc plates.

The boilers will be designed to steam in conjunction with a heated forced-draft system. The heating surface will be about 6300 square feet.

The boiler fronts as far up as the top heads to be made in two plates and flanged to receive furnaces. Boiler shells steel, double riveted. Butt straps outside and in. No longitudinal butt strap to come within several feet of the bottom of the boilers. Circular seams double riveted. All internal plates steel. Tubes iron, 2¾ inches outside diameter; ordinary tubes No. 11 B.W.G. thick; and stay tubes 5/16-inch thick upset and threaded at both ends. All rivet holes drilled after the plates are bolted together and afterwards taken apart to clean. Rivets, steel. Longitudinal stays, steel. Combustion-chamber stays, iron, screwed into both plates. Manholes in top and front end. The boilers to be constructed for 190 pounds steam pressure per square inch and tested by hydraulic pressure to American Bureau of Shipping requirements. The combustion chambers, separate type. Boilers fitted with spring safety valves, blow valves, etc. Brass gage cocks fitted on cast-iron column on back of each boiler. Stop valves fitted on each boiler as well as wing throttle valve on main steam pipe. Boilers lagged on shell and back head down the line of saddles with nonconducting composition with hard finish. Boilers fitted with uptakes, heater boxes, and smoke boxes of steel with baffle plates and necessary rings and catches.

Each furnace will be fitted with all necessary fittings for heated forced draft for burning oil. Furnace fronts will be suitably supported to carry baffles and draft-regulating valves. No coal-burning furnace fittings will be furnished.

Air heater boxes will consist of a lower and upper tube sheet, into which will be expanded 3-inch tubes, through which the gases will pass on their way to the smokestack. The air for the furnaces will be circulated around these air-heater tubes by means of a blower, as is customary with Howden system of forced draft. After passing the air-heater tubes, the air will be led by ducts to the furnaces. A division plate will be fitted in the uptake.

Water-tube boilers may be substituted for Scotch boilers of size and type approved by owner's representative.

56. Fuel-Oil System

The boilers will be fitted with apparatus for burning Mexican oil on an approved mechanical atomizing system. The system will be complete with the necessary pumps, heaters, strainers, reducing valves, pump governors, burners, and piping. There will be two fuel-oil service pumps piped so they can draw from the fuel-oil tanks and discharge through the heaters to the oil burners. There will also be provided one transfer pump for pumping oil from any one of ship's tanks to any other tank and overboard. A small commercial type vertical donkey boiler, about 34 inches diameter by 6 feet 6 inches high and 120 pounds working pressure, will be supplied for getting up steam and will be fitted for coal burning only.

Heater coils of 2-inch diameter standard galvanized wrought-iron pipe will be fitted in inner bottom tanks under engine and boiler rooms and 2-inch standard black wrought-iron pipe in bunker tanks with 1-inch supply and drain pipes. There will be a 1½-inch galvanized heater coil around each suction in double bottom

under Nos. 1, 2 and 3 holds.

The coils under engine and boiler rooms will have line-pipe couplings and ground joint flange unions and wrought pipe return bends. The coils in other tanks will have standard cast-iron galvanized fittings and return bends.

57. Stack

The stack will be double 7-foot diameter, with a 6-inch air space, and about 72 feet high above lower grates, built of steel with cape on lower part above deck, with wire rope guys with turnbuckles. Owner's house mark riveted on funnel. Waste steam pipe above casing made of copper and carried well up outside of stack. Inner stack to be ¼ inch and 3/16 inch thick and casing to be 9/16 inch and 3/16 inch thick. A division plate 8 feet high will be fitted in the stack from the uptake to the bridge deck.

58. Forced-Draft Blowers

One 60-inch steel plate fan direct connected to one 6 x 5-inch single vertical engine will be located in the engine room and supply air through ducts to the air-heater boxes.

59. Ventilators and Hoisting Gear

Two 42-inch ventilators with movable galvanized steel cowls operated from the gratings to be fitted for the fireroom. The ventilator trunks below deck to be of black steel, painted. The port ventilator will be fitted with block and tackle for hoisting from the fireroom.

60. Evaporator

One 20-ton evaporator of an approved make with cast-iron shell to be installed with vapor connection piped to the auxiliary exhaust main.

61. Feed Water Heater

A feed water heater of an approved make will be installed.

62. Feed and Filter Tank

A feed and filter tank of about 80 cubic feet combined capacity will be fitted in the engine room for receiving the main air-pump discharge, the engine drains, and the drains from the auxiliary condenser and feed water heated.

63. Oil Tanks, Waste Locker, Etc.

Oils tanks, etc., will be provided as follows:

Three engine oil tanks, to hold 100 gallons each.

One cylinder oil tank, to hold 40 gallons.

One Colza oil tank, to hold 40 gallons.

One mineral sperm tank, to hold 40 gallons, extra heavy.

One iron tank for soda, to hold about 200 pounds.

Tanks to have doors, lock cocks, and drip pans, with filling pipes 2 inches in diameter connected as directed, flanged, fixed, and fitted complete, including larger copper funnels with screw connections to screw into pipe and so arranged that oil can be emptied from barrels on deck. These tanks will be made of galvanized sheet steel. Two brass trays with perforated false bottoms and brass cock for oil feeders. Tanks to be properly stored in engine room on suitable platform provided with ladders and handrails as required. A galvanized sheet steel waste locker of suitable size, with locks, will be fitted in engine room.

Soo Canal Report

The commerce carried through the Soo canal last month was greater than the total set in July, despite the fact that the iron ore shipments from upper lake ports declined last month. The August movement aggregated 13,967,108 net tons, against 13,650,047 net tons in July. The total freight movement through the Soo canals up to Sept. 1 shows a decline of 5,640,473 net tons from the total moved in the corresponding period of 1916. This relative decline compares with 5,576,319 net tons up to Aug. 1; 5,177,962 net tons up to July 1; and 5,442,656 net tons up to June 1. The total movement so far this year aggregates 49,908,500 net tons, against 55,548,973 net tons moved to Sept. 1, 1916.

Of the August movement, 11,587,680 net tons passed through the American canal, and 2,379,428 net tons passed through the Canadian canal. The eastbound movement aggregated 10,840,793 net tons, and the westbound movement, 3,126,315 net tons. The eastbound iron ore movement totaled 10,212,956 net tons, against 10,308,743 net tons in July. The westbound coal movement last month was 2,919,852 net tons, a big increase over July, when 2,382,676 net tons were carried.

The detailed report of the Soo commerce up to Sept. 1, 1917, and to Sept. 1, 1916, follows:

EAST BOUND

	To Sept. 1, 1916	To Sept. 1, 1917
Flour, barrels	4,857,568	4,152,259
Wheat, bushels	141,505,221	86,202,329
Grain, bushels	52,092,570	44,843,224
Copper, net tons	64,709	75,342
Iron ore, net tons	37,838,455	35,476,517
Pig iron, net tons	19,619	5,724
Lumber, M. ft. B. M.	195,365	216,422
Gen'l merch., net tons.	164,596	133,640
Passengers, number	23,802	15,056

WEST BOUND

Flour, barrels	13,185	80
Grain, bushels	3,760	1,475
Coal, hard, net tons	1,305,594	1,418,285
Coal, soft, net tons	9,158,100	7,707,044
Iron ore, net tons	24,927	38,005
Mfctd. iron, net tons	96,653	63,698
Salt, barrels	465,455	338,153
Gen'l merch., net tons.	767,076	752,852
Passenger, number	23,462	16,012

SUMMARY

Vessel passages, No.	15,406	13,121
Regis. tonnage, net	41,905,523	37,723,681
Freight:		
Eastbound, net tons	44,121,701	39,878,351
Westbound, net tons	11,427,272	10,030,149
Total frgt., net tons.	55,548,973	49,908,500

The Mississippi Shipbuilding Corp., Johnson Point, Back Bay, Biloxi, Miss., has begun work on the first of six 2000-ton auxiliary schooners for the lumber trade. C. H. Daughrell, New York, has been appointed general superintendent, and 500 men are working in the yard.

August Ore Shipments

During August the lake fleet moved again more than 10,000,000 tons of ore. The actual shipments from upper lake ports were 10,146,786 tons, making the second month in succession that the fleet has handled more than 10,000,000 tons. The August record fell about 95,000 tons below July shipments, but is well above any other month.

The total shipments up to Sept. 1 total 36,523,554 tons against 39,221,149 tons shipped in the corresponding period last year. The decrease of 2,692,310 tons is about 1,000,000 tons less than the decline shown on June 1. Owing to the late opening of the season, the fleet on June 1 was 3,612,847 tons behind its 1916 record. On July 1 this total had been cut to 3,480,432 tons and on Aug. 1 to 2,988,956 tons.

The unloading problem continues to prove the most serious one which vessel interests are facing as the lake fleet has repeatedly proved its ability to meet the war emergency demands of the iron and steel industry. The 10,000,000-ton records set up in July and August were made in the face of serious delays at unloading ports. The various measures taken by the government, lake interests and railroads to solve the unloading problem, the coal shortage in the northwest, and the question of proper distribution to interior furnaces, have exerted a favorable influence. A total movement this year of 60,000,000 tons is generally felt to be sufficient to keep the country's iron and steel industry in full operation provided the ore is distributed properly to individual blast furnaces. Detailed shipments follow:

Port	August, 1917	Sept. 1, 1917
Escanaba	951,620	4,089,191
Marquette	629,426	1,899,062
Ashland	1,278,118	4,425,912
Superior	2,444,632	8,202,216
Duluth	3,326,254	11,999,021
Two Harbors	1,516,736	5,908,152
Totals	10,146,786	36,523,554
1917 increase	296,646	
1917 decrease		2,692,310

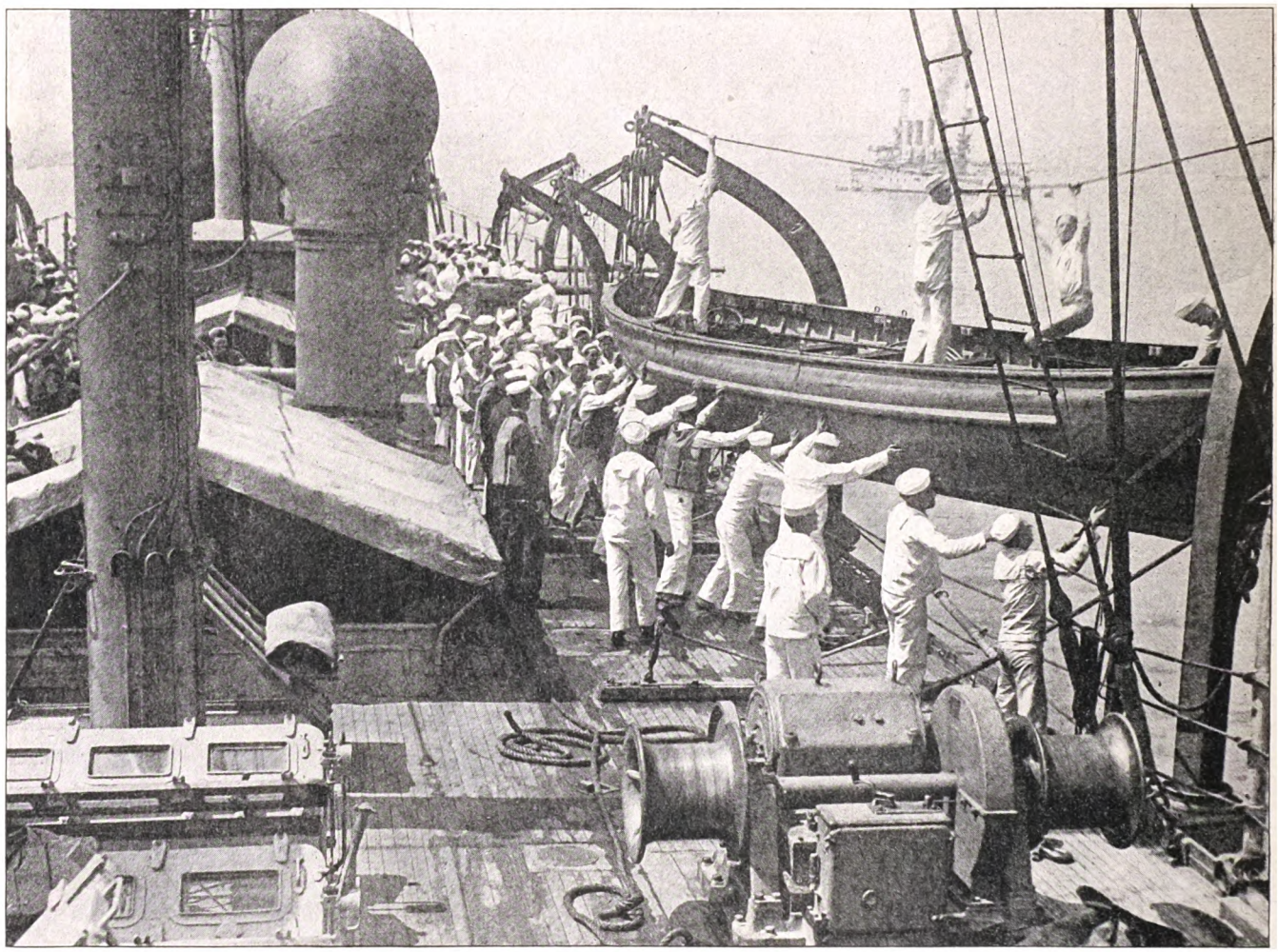
Lake Erie Receipts

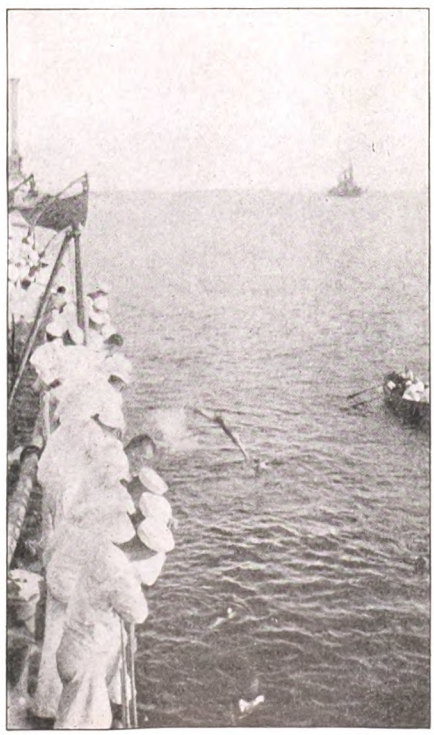
Out of a total of 10,146,786 tons of iron ore shipped from upper lake ports in July, Lake Erie ports received 7,962,443 tons, as shown by the records of THE MARINE REVIEW. The balance on dock on Sept. 1 was 6,705,672 tons against 5,845,228 tons on Sept. 1, 1916. The detailed receipts by ports follow:

Port	Gross tons
Buffalo and Port Colborne	1,252,813
Erie	309,593
Conneaut	1,413,298
Ashtabula	1,646,322
Fairport	359,493
Cleveland	1,548,159
Lorain	658,827
Huron	291,365
Toledo	425,810
Detroit	56,763
Total	7,962,443

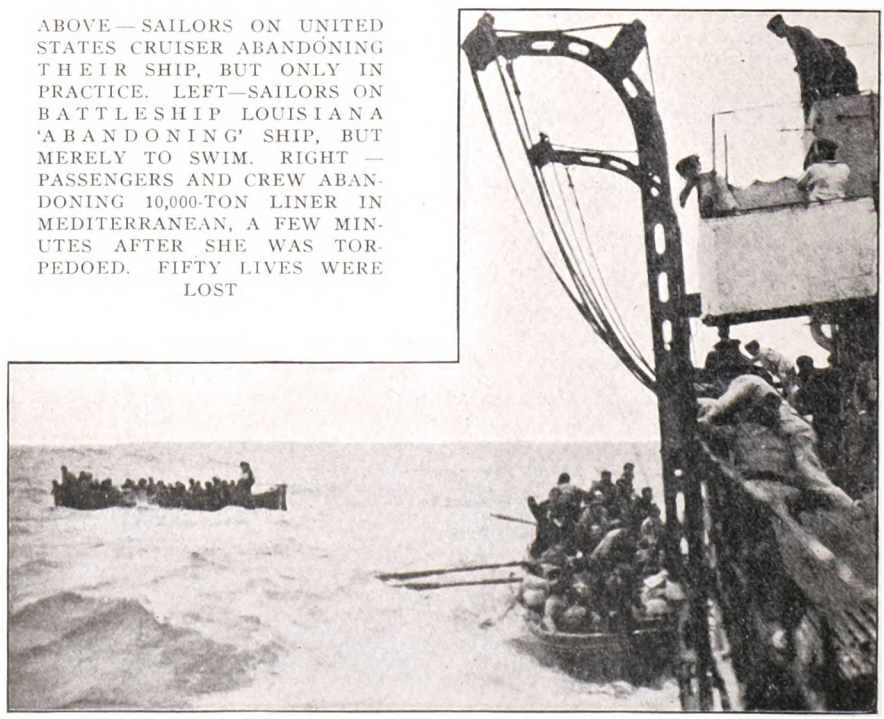
Photographs From Far and Near

Contributions For These Pages Are Solicited



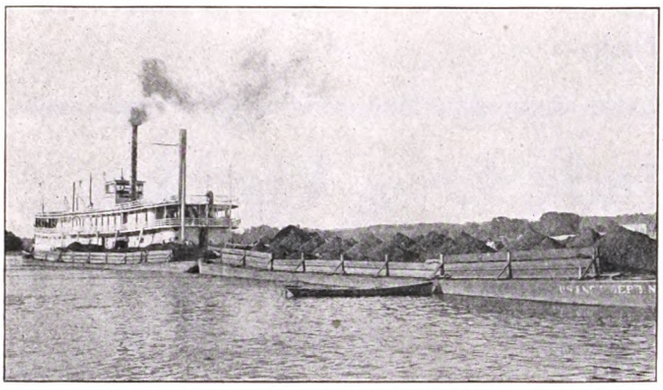


ABOVE — SAILORS ON UNITED STATES CRUISER ABANDONING THEIR SHIP, BUT ONLY IN PRACTICE. LEFT—SAILORS ON BATTLESHIP LOUISIANA 'ABANDONING' SHIP, BUT MERELY TO SWIM. RIGHT — PASSENGERS AND CREW ABANDONING 10,000-TON LINER IN MEDITERRANEAN, A FEW MINUTES AFTER SHE WAS TORPEDOED. FIFTY LIVES WERE LOST

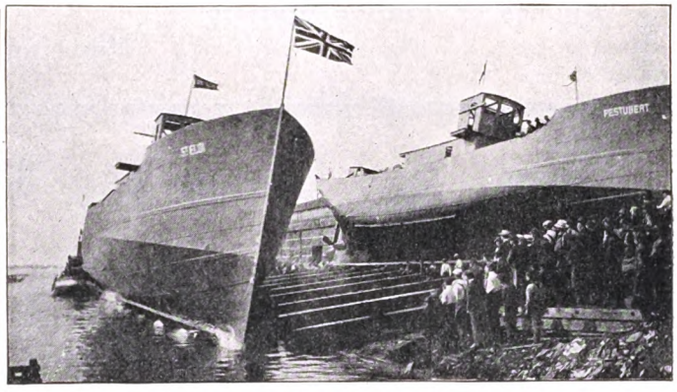


Latest Marine News in Pictures

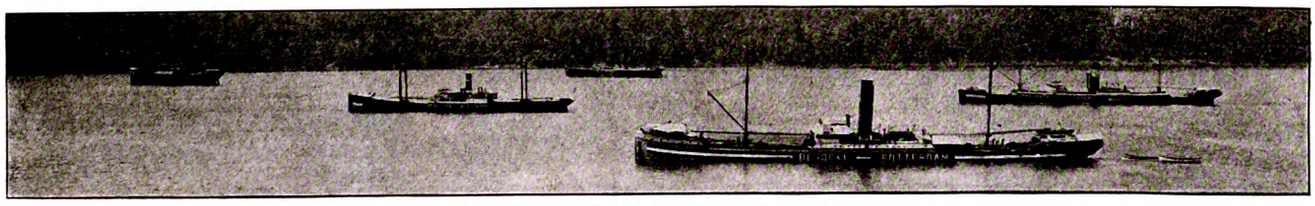
Payment Will Be Made For Acceptable Photographs



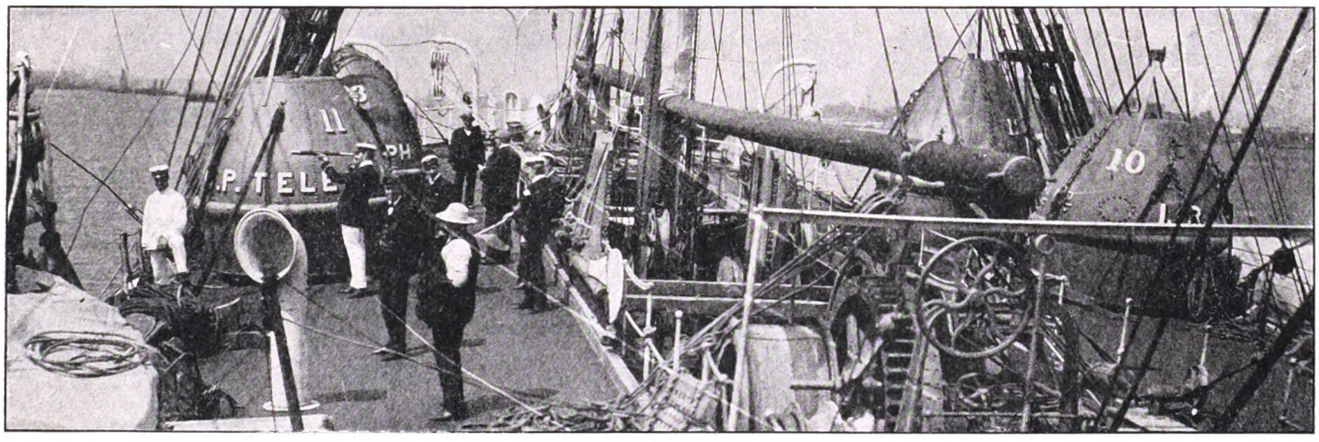
BARGES CARRYING 3600 TONS OF IRON ORE ON INAUGURAL ST. PAUL-ST. LOUIS TRIP



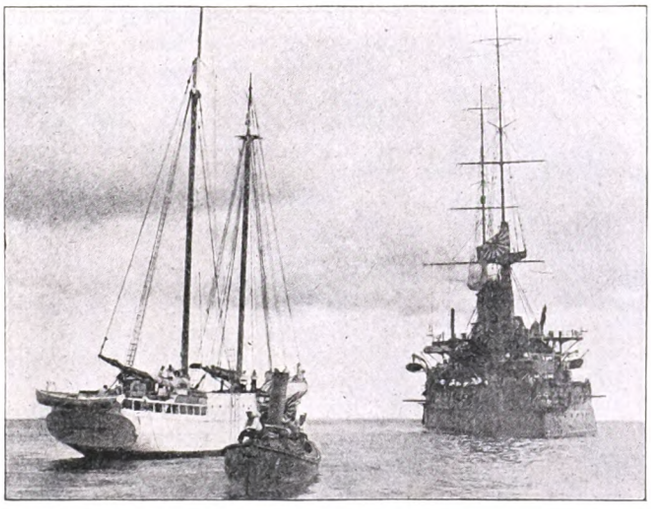
NEW CANADIAN FISHERIES BOAT SNAPPED JUST BEFORE TAKING THE WATER



DUTCH BOATS ANCHORED IN HUDSON RIVER AWAITING PERMISSION TO SAIL



DECK SCENE ON CABLE SHIP SHOWING GREAT BUOYS AND CABLE-LAYING MACHINERY



JAPANESE PRIZE CREW BOARDING GERMAN COPRA SCHOONER

SHIPS OF ANCIENT DESIGN STILL PLY TIGRIS RIVER AT BAGDAD

What the Government is Doing

Rulings on Marine Matters — Improvements to Waterways

Hints to Navigators

Ships Must Be Made Less Visible

FEDERAL authorities are giving serious attention to the problem of giving American vessels "low visibility". At the same time, regulations have been issued and others are being prepared, which are designed to increase the chances of a merchantman escaping from a submarine.

The French word *camouflage,* which has come into such widespread use, covers the problem of reducing a ship's visibility. It is understood that among the agencies at work on this problem are the naval consulting board, of which W. L. Saunders of the Ingersoll-Rand Co., New York, is chairman; the committee on ship protection of the emergency fleet corporation, and the Submarine Defense association, 141 Broadway, New York.

Needless to say, these bodies are working in close co-operation with the government's war risk insurance bureau, which has announced a new set of regulations relating to the arming of vessels and to devices for rendering ships less visible. These regulations in full are as follows:

With a view of minimizing the hazard to vessels trading to or from all ports to Europe and ports on the Mediterranean coast of Africa and vice versa, the following requirements will be insisted upon as to all vessels sailing to the above-named destinations on and after Oct. 1:

1. Arming

All vessels must be armed in accordance with the recommendation of the navy department, or in event of the navy department being unable to furnish such armament, the vessel owners must furnish to the bureau of war risk insurance satisfactory evidence that such armament has been applied for and can not at the time be supplied.

The bureau will charge an additional rate of 1 per cent on each voyage on vessels failing to comply with this requirement.

2. Regulations Affecting Visibility

(*a*) Each vessel shall be painted in accordance with one of the systems that are recommended by the chairman of the naval consulting board and the ship protection committee of the emergency fleet corporation, as approved by the bureau of war risk insurance. Information relative to these various methods of painting, and how the painting can be arranged for, will be furnished upon application by the bureau of war risk insurance, treasury department, Washington.

It is to be understood that shipowners are free to select any one of the approved methods for their own use. Should a shipowner desire to follow his own method, it must first be submitted to and receive the approval of the chairman of the naval consulting board, 11 Broadway, New York City.

Upon completion the shipowner must furnish the collector of customs at the loading port with a certificate from the party performing the work, certifying that the work has been performed and containing all necessary information.

(*b*) *Coal.*—Each steamer at time of sailing from the United States must carry a sufficient supply of approved smokeless fuel to carry her for not less than two daylight periods, this coal to be used during the daylight runs while within the submarine zone.

Any steamer which is equipped with an approved system whereby the vessel may be operated without the emission of visible smoke from her stack shall be relieved from the above requirement.

(*c*) *Smoke Screen.*—All vessels operating through the submarine zone must carry on deck one dozen approved smoke boxes which will evolve smoke when thrown overboard.

Vessels must obtain from the collector of customs a certificate that all the requirements under the heading of No. 2 have been complied with.

In event of the failure to obtain such a certificate, the bureau will charge an additional premium of ½ per cent for each voyage.

The bureau reserves the right to decline to insure vessels whose owners have not in the opinion of the bureau made a satisfactory effort to comply with these requirements.

Use of Smoke Boxes

Smoke boxes to assist merchant vessels deceive hostile submarines and make their escape have been advocated by the department of commerce as well as by the navy department. These boxes consist, it is understood, of an artificial funnel with a smoke-making attachment which can be thrown overboard when a submarine is sighted, thus tending to conceal the flight of the merchantman. In a statement issued by Secretary Redfield, American merchant vessels are advised to equip themselves with these contrivances. The announcement was as follows:

"The bureau of ordnance of the navy department is having manufactured by the du Pont company smoke boxes suitable for use by merchant vessels as a means of escape from attacking submarines. Merchant vessels desiring to procure these smoke boxes can obtain them from the du Pont company. The cost will be approximately as follows: Smoke funnels, $125 each; phosphorus, $1.75 per pound; smoke boxes, $25 each.

"The smoke funnel is for the production of smoke on board the vessel, and requires only the fuel for its continued use. The smoke boxes are for throwing overboard, and once used cannot be recovered.

"The navy department is preparing to issue smoke boxes to all vessels carrying armed guards, and has announced as its policy that smoke producing apparatus for the use of merchant vessels should be available for every vessel desiring to purchase same. It is urged that merchant vessels give prompt and favorable consideration to the desirableness of purchasing smoke producing apparatus.

"The war instructions for merchant vessels of the United States issued by the navy department contain directions for the use of smoke producing apparatus, and the bureau of ordnance of the navy department issued a pamphlet dealing with the particular type of smoke producing apparatus

manufactured by the du Pont company.

"The department of commerce regards this matter of great importance for the protection of our merchant vessels."

Use of Paint

Further details regarding the new requirements of the bureau of war risk insurance have been communicated by William C. De Lanoy, chief of the bureau, in a letter to shipowners as follows:

"In reply to your inquiry, I enclose copy of our notice regarding minimizing the hazard to vessels trading to or from all ports to Europe and ports on the Mediterranean coast of Africa and vice versa, giving the requirements that will be insisted upon as to all vessels sailing to the above-named destinations on and after Oct. 1, viz:

"1. Arming.

"2. Regulations affecting visibility; (a) painting; (b) coal; (c) smoke screen.

"(a) Painting: The bureau of war risk insurance, acting under the advice of the naval consulting board, has approved the system of painting as carried out by any of the following concerns: William A. Mackay Co., 343 East Thirty-third street, New York; Louis Herzog, 690 West End avenue, New York; Jerome Brush, 553 East Eighty-sixth street, New York; Maximilian Toch, 350 Fifth avenue, New York.

"You can obtain full particulars by communicating with any of these concerns, and they will furnish you with a certificate to be filed with the collector of customs at the loading port.

"Should you desire to follow your own system and do your own painting, particulars must be submitted to the chairman of the naval consulting board, 11 Broadway, New York, and his approval obtained.

"(c) Smoke Screen: The only smoke boxes approved at this time are those furnished by the navy department or the E. I. du Pont de Nemours Powder Co., Wilmington, Del., but if any others are submitted the question of their approval should be at once referred to the bureau of war risk insurance."

The Submarine Defense association is trying to get private underwriters to follow the war risk bureau's lead in giving a preferential rate on vessels equipped with the new devices.

A resolution recently passed by the Submarine Defense association reads as follows:

"The association will act in the best of good faith and with the utmost fairness towards all parties submitting proposals, and favors payment of liberal compensation for such devices as meet with adoption and practical success. It cannot become involved, in any way, in any controversy concerning any matter submitted to it, and particularly concerning questions of priority or possible conflict between submitted matters, and for this reason must require that all parties making proposals shall first conserve their own rights therein, and to such extent as they may deem to be adequate, by filing patent applications or otherwise, and except as they may have protected their rights under the patent statutes shall, in writing, waive any and all claim against the association, or any of its officers, members or representatives, by reason of anything it or they may do or fail to do in connection therewith. The United States patent office has arranged for the suspension from publication of any patents shown to be likely to be of use to the enemy, so that no danger need be apprehended from the filing of application for patent as herein suggested.

"No proposal shall receive consideration by the association until it has been submitted in writing in definite form and the proposer thereof has in writing accepted the conditions above stated."

It is the hope of the government that through the two methods, first of rendering a ship as little visible as possible, and then, if sighted by a submarine, of enabling her to conceal herself by a smoke screen, emitted either from a box thrown overboard or from a false funnel, many vessels will be saved from destruction.

Labor Adjustment Board

EDWARD F. CARRY, Chicago, president, Haskell-Barker Car Co., has been named on the United States shipbuilding labor adjustment board. He is a large manufacturer of cars and is recognized as one of the leading business men of the middle west.

This completes the membership of this board that has in hand the adjustment of labor disputes in American shipyards where the United States shipping board or the Emergency Fleet corporation has ships under construction and repair. It applies to all classes of shipbuilding, wood and steel. The board is constituted of three men—Alfred J. Berres, secretary and treasurer of the metal trades department of the American Federation of Labor; Everit Macy, New York, representing the public; and Mr. Carry, representing the Emergency Fleet corporation.

Louis B. Wehle has been appointed counsel of the United States shipbuilding labor adjustment board.

Rear Admiral Washington L. Capps, general manager of the Emergency Fleet corporation, comments as follows, relative to the adjustment board established to carry out a plan for labor adjustment in shipyards:

"It is hoped that the plan for labor adjustment in private shipyards, where the Emergency Fleet corporation is having ships built, will bring about a broad understanding between the employers and employes, based upon a fair and just attitude of both groups toward questions which may arise from time to time. Both groups consist of American citizens who would naturally wish to facilitate the building of the ships which may prove so vitally necessary to this country in the prosecution of the war. When such a common purpose is borne in mind by those who participate in the deliberations of the adjustment board and by those who are affected by its decisions, the labors of the board should be productive of the very best results, and it should be with that expectation and intent that all such adjustments should be undertaken."

Comment of Mr. Gompers

Samuel Gompers, chairman of the committee on labor of the council of national defense, makes the following comment:

"The agreement of the adjustment of labor conditions on work for the Emergency Fleet corporation and the shipping board will inspire confidence in the men in the shipbuilding trades because it is based upon standards, relations and responsibility that are in accord with fair dealing. As standards for wages and conditions of work, the agreement adopts the standard of trade unions and trade agreements and provides for the adjustment of all new questions by a commission in which all parties in interest are to have representation.

"The agreement indicates a desire of the government and organized labor to deal with labor problems with a spirit of fairness. Its conformity in principle to the memorandum of June 19 between Secretary Baker and me to adjust labor difficulties developing in cantonment and construction augurs much for its effectiveness. This plan was later extended to cover aviation work, repairs and all land construction work for both army and navy.

"Louis B. Wehle was very helpful in mediating between the various interested parties and in formulating the agreement which was reached.

This agreement as well as the memoranda for cantonment construction for the army and navy constitute gratifying progress in providing agencies for assuring justice to war work.

"To complete the entire program, this should be supplemented by a similar provision for production of munitions and war supplies."

Agree on War Wages

At a conference held at Washington, an agreement was reached between representatives of the Atlantic steamship lines and the organized seamen, in cooperation with the United States shipping board, the department of labor, and the department of commerce, providing for the scale of wages to be paid by substantially all of the lines and initiating certain other measures which are intended to increase the number of seamen in service.

The representatives of the steamship companies and of the organized seamen agreed with the shipping board that such action ought to be taken in order to furnish men for the vessels engaged in trade with England and France and carrying supplies to those countries, while at the same time continuing an uninterrupted coastwise trade. The measures that were tentatively adopted under the agreement to co-operate for the attainment of this end were:

That the steamship companies shall pay the following wages: Sailors and firemen, $60 per month; coal passers, $50; oilers and water tenders, $65; boatswains, $70; carpenters, $75; overtime pay for cargo work, 50 cents, and for ship work 40 cents per hour; bonus going to the war zone, 50 per cent of the wages, wages and bonus to continue until crew arrives back in the United States; and $100 compensation for loss of effects caused by war conditions. The scale of wages and bonus for cooks and stewards at present in force to be maintained and continued during the continuance of this agreement.

That a certain number of boys, to be determined by the number of men carried, shall be employed in addition to the usual crew, and that a number of ordinary seamen shall be employed in a similar fixed proportion to the number of able seamen. A vessel now carrying eight men on deck would carry six able seamen, two ordinary seamen, and two boys, such ordinary seamen and boys to have ample opportunity to learn the work usually demanded of able seamen.

That the representatives of the organized seamen shall have access to and be permitted on docks and vessels during reasonable hours.

The representatives of the seamen tentatively agree to join with the shipowners in an appeal to seamen now employed on shore to come back to the sea.

That the bonus and other conditions arising from the war shall terminate with the war, and that the wages set shall remain for one year, to the end that wages may be stabilized and that the men now on shore may be induced to return to the sea.

That the seamen will use earnest efforts in co-operation with the officers to teach seamanship to the boys and ordinary seamen.

The representatives of the shipping companies at the conference were H. H. Raymond, of the Atlantic, Gulf & West Indies Steamship Lines; P. A. S. Franklin, of the International Mercantile Marine; Frank C. Munson, of the Munson Line; Ernest M. Bull, of the Bull Line; L. H. Sherman, of the Grace Line; and D. T. Warden, of the Standard Oil Co. Commissioner Chamberlain represented the bureau of navigation. The representatives of the organized seamen were President Andrew Furuseth, of the International union, H. P. Griffin, G. H. Brown, Oscar Carlson, Dan Ingraham, and P. J. Pryor.

It was announced at the conference that the agreement had been put to the vote of the unions and ratified by their membership.

August Lake Levels

The United States lake survey reports the stages of the Great Lakes for the month of August, 1917, as follows:

Lakes	Ft. above mean sea level July	August
Superior	602.65	602.69
Michigan-Huron	581.95	581.90
St. Clair	576.72	576.62
Erie	573.86	573.57
Ontario	247.46	247.35

Lake Superior is 0.04 foot higher than last month, 1.00 foot lower than a year ago, 0.05 foot above the average stage of August of the last 10 years, 1.24 feet below the high stage of August, 1876, and 1.09 feet above the low stage of August, 1879. During the last 10 years the August level has averaged 0.2 foot higher than the July level and 0.1 foot lower than the September level.

Lakes Michigan-Huron are 0.05 foot lower than last month, 0.85 foot higher than a year ago, 1.10 feet above the average stage of August of the last 10 years, 1.61 feet below the high stage of August, 1876, and 2.05 feet above the low stage of August, 1911. During the last 10 years the August level has averaged about the same as the July level and 0.2 foot higher than the September level.

Lake Erie is 0.29 foot lower than last month, 0.75 foot higher than a year ago, 0.95 foot above the average stage of August of the last 10 years, 0.54 foot below the high stage of August, 1876, and 2.19 feet above the low stage of August, 1895. During the last 10 years the August level has averaged 0.2 foot lower than the July level and 0.3 foot higher than the September level.

Lake Ontario is 0.11 foot lower than last month, 0.01 foot lower than a year ago, 0.75 foot above the average stage of August of the last 10 years, 0.91 foot below the high stage of August, 1862, and 3.00 feet above the low stage of August, 1895. During the last 10 years the August level has averaged 0.3 foot lower than the July level and 0.4 foot higher than the September level.

Equipment for Ships Entering War Zone

On account of the special dangers to inspected passenger and freight steam vessels of the United States from torpedo attacks in the war zone when vessels are quickly sunk and, in consequence, the necessity for a larger equipment of lifeboats and life rafts, and a larger supply of food and provisions to be carried in lifeboats, the executive committee of the board of supervising inspectors, steamboat inspection service, at a meeting held recently, adopted rules applying to such inspected steam vessels of the United States entering the war zone. The rules read as follows:

Lifeboats and Provision

The capacity of lifeboats shall hereafter be determined by an allowance of 15 cubic feet for each person carried instead of 10 cubic feet, as heretofore.

In addition to the equipment already required in lifeboats, there shall be provided a hand pump with a plunger of not less than 2 inches in diameter, and a discharge pipe of sufficient length to reach clear of the boat's side.

The food or provisions required to be carried in lifeboats may be hard bread or the United States army emergency ration. Food which produces unusual or immoderate thirst, such as corned beef, salt fish, etc., will not be allowed under any circumstances as lifeboat provisions.

When hard bread only is carried in the lifeboat there must be provided in addition thereto at least 10 United States army emergency rations.

Lifeboats on cargo steamers shall be provided with a separate set of davits for each lifeboat required. When this requirement makes it necessary to install additional davits, it is recommended that the additional davits be of the mechanical type, to facilitate quick and safe launching. The old type of davits with "turning-out gear" is not considered as mechanical davits.

Cargo vessels shall carry sufficient

lifeboats to accommodate every person on board, and in addition thereto shall carry a sufficient number of approved life rafts to accommodate at least 25 per cent of the total number of persons on board.

Before entering the war zone, all the lifeboats and life rafts shall be cleared away and made ready for launching, and the master or officer in charge shall assure himself that all the required equipment is in the lifeboats and life rafts, in good order, and ready for immediate service. Steamers which are not equipped with mechanical davits shall have all the lifeboats swung out (weather permitting) and ready for immediate launching before entering the war zone.

Future Construction

Cargo vessels contracted for after May 1, 1917, and serving trades within the war zone, shall be equipped on each side with lifeboats of sufficient capacity to accommodate all persons on board based upon an allowance of 15 cubic feet per person, and in addition thereto shall be equipped with a sufficient number of approved life rafts to accommodate at least 25 per cent of all persons on board.

Recommendations

Reliable information is to the effect that many or nearly all of the lives that have been lost from vessels after attack has been due to the fact that, in many instances, the boats have been launched while the ship has had considerable way, either ahead or astern, and that engineers have been compelled to abandon the engine room while the engines were still working.

It is suggested, therefore, that the bridge watch, or the master, assure themselves, if possible, that the engines are at rest and the way off the vessel before the boats are launched. It is also strongly recommended that, due to the possibility of the boats on the weather side of the ship not being available, the full lifeboat capacity on cargo ships be carried on each side so that full capacity may be available at all times.

It is strongly and earnestly recommended that on all vessels entering the war zone, or the dangerous areas, the passengers and crew be kept fully prepared (so far as may be possible or the navigation of the vessel permits) for speedy and immediate disembarking, or abandoning ship in case of emergency, and that the crew be furnished with life preservers of such character as to allow the free use of the arms in rowing and boat launching. All should be warmly clad without unnecessary or hindering incumbrance.

The requirements and suggestions herein set forth should be met promptly and generously, and it is expected that all concerned will co-operate in making better and safer conditions in the navigation of dangerous areas. Local inspectors, however, will not unnecessarily delay vessels from proceeding on their voyage to ports of the allied governments if it is not possible to meet these requirements previous to the appointed time of departure.

Capt. Joseph M. Lewis, Boston, superintendent of the Scott Wrecking Co., died from heart disease recently. He had been associated with the Merritt & Chapman Wrecking Co. and commanded many vessels owned by the Boston Tow Boat Co.

Country's Need of Improved Terminals

To the Editor of THE MARINE REVIEW:

"The problem is not solved with the providing of ships. The railroads and the seaboard terminals are just as essential to the business of foreign trade. Many difficulties now exist in the movement of goods from the interior to the sea-going vessels in the harbor. Foreign countries have realized this fact and have provided elaborate terminal facilities in such cities as Liverpool, Antwerp, Hamburg, Rotterdam and other European ports. In all these instances the purpose has been to reduce the cost of handling freights. In contrast with this specialization abroad, the American has relied upon natural harbor facilities, and the failure of a co-operative relationship between steamship, harbor, and railroad is just being realized. Any real headway in foreign trade must depend upon the meeting of these conditions. America must develop cheaper ships, less expensive operation, better harbor facilities, and a working arrangement with railroads at seaboard terminals."

The above is to be found on pages 197 to 198, Vol. 2 of the Alexander Hamilton Institute course in modern business. The immediate attention to this is of the utmost importance for the handling of general cargoes. Bulk cargoes, such as wheat, ore, cement, coal, cotton, etc., have been given attention in our harbors, but mixed or general cargoes have not.

The principal objections to the present method of handling general cargoes in the ports of this country are as follows:

There are no cranes on our docks and the docksheds are used for long time storage.

The ships tackle is too slow, giving an average dispatch of only 10 to 15 tons per hour per hatch, while properly developed dock cranes have a capacity of from 25 to 40 tons per hour per hatch, which again may be increased by using the ships tackle to load to or from barges.

In forwarding material to Europe this would increase the capacity of our shipping 10 to 15 per cent both now and in the future, while it would cut down the cost of handling materially, and instead of having to build new docks, the capacity at present docks would be increased about three times.

A dock shed used for storage is an economic disaster, as it resolves itself into the use of property worth $100,000 to $1,000,000 per acre as 1-story warehouse property, which in itself is absolutely ridiculous. Dock sheds should be used for assembling outgoing and for sorting incoming cargo only. If any long-time storage—48 hours or more—is desired, this should be done in adjoining warehouses, connected with the sheds, preferably by mechanical conveyor such as a monorail carrier system of if not feasible on account of local conditions, by truck, car or barge.

In most cases present docks may be remodeled to handle general cargo along these lines at not an excessive cost, although a new dock development may have the advantage of being able to run a track between the water and the dockshed. While this is not as important as may be thought at first analysis, it is of special advantage when forwarding heavy machinery and freight from open car, also in coaling the land side of the vessel, while taking on cargo. The water side may then be coaled by barge.

To take our place in foreign commerce this development is ultimately needed, and with the shortage of bottoms such as exists at present, every dock-owning corporation and individual in this country should give this their immediate attention.

A. H. LAMM,
Portland, Oreg.

Lake Levels and Winter Navigation

To the Editor of THE MARINE REVIEW:

I note in the August issue of THE MARINE REVIEW, several letters relative to the question of winter navigation on the lakes.

It seems to me, however, that one of the most vital points affecting this question has been overlooked, namely, the effect of an open channel on the water levels of the entire water route in question. The ice forming as it does a natural dam, to a marked degree tends to hold back the water and, consequently, maintain a higher water level throughout the summer season. The partial removal of this obstruction would have a very marked effect on the lake levels, and would undoubtedly cause the expenditure of a very large sum in dredging, etc., to overcome the results.

Outside of this I do not see any great difficulty in maintaining all-year navigation in the lakes with the possible exception of some difficulty in the operation of canal locks.

Very truly yours,
S. Matheson, New York.

The old steamer SARONIC, which was rebuilt, has been named the W. L. KENNEDY. The steamer was built at Sarnia in 1882.

Marine News of the War

Interesting Sidelights on the World War Gathered During the Past Month and Condensed for the Busy Reader

AN ANALYSIS of the steamers sunk since Feb. 1, when the ruthless submarine campaign was inaugurated, shows that less than 10 per cent of the boats making 15 knots and over an hour, have been destroyed when attacked. Of the slower boats, especially those of seven, eight and nine knots, the percentage has been as high as 90. He points out that the boats of the White Star Line, which make 16 knots or better, have been practically immune from submarine attacks. The same is true of the vessels of the Cunard, the American and other big steamship companies. The ADRIATIC, a 24,000-ton steamer, with a speed of 16 knots; the 23,000-ton BALTIC, the 18,000-ton LAPLAND, the 21,000-ton CEDRIC and CELTIC, all capable of making 16 knots, have been making their regular trips through the war zone without injury. The same applies for the steamers ST. LOUIS, NEW YORK, PHILADELPHIA, ST. PAUL, KROONLAND, FINLAND, CARMANIA, CARPATHIA and ANDANIA. Once in a while one of these fast boats has struck a mine, but that is liable to happen to any vessel. The giant 35,000-ton JUSTICIA, now in transatlantic service, making 18 knots, and more under pressure, has had no trouble with the submarines. All of the above named vessels have speed, which is essential to the successful passage of the U-boat zone. They can zigzag, they can run when attacked, and, being heavily armed, can fight. The LUSITANIA, a very fast boat, was torpedoed, but was unarmed. On the other hand, slower boats, though armed, have been sunk each week. In many instances the submarine overhauls these vessels by being able to go faster above water than its victims.

* * *

Two hundred tons of steel plates were recently discovered stowed away beneath a mass of cargo in the bottom of the hold of the former German steamer O. J. D. AHLERS at the Union Iron Works, San Francisco. While the plates are such as might easily have been used for the construction of a submarine, it is believed they were intended for commercial purposes, as the cargo contained no angle irons or other metal work which would be necessary for submarine construction. The O. J. D. AHLERS was in Sydney at the time war was declared between Great Britain and Germany and during the night she ran from the harbor and made for Hilo, Hawaii, where she was interned.

* * *

The shipyards of the British Isles turned out about 580,000 tons of shipping in 1916. Premier Lloyd George's recent statement that these yards would build about "four times as many ships as last year," indicates an output of 2,300,000 tons in 1917. "Six times as many in 1918," as Lloyd George predicted, would mean an output next year of 3,480,000 tons. The best pre-war record was 2,050,000 tons.

* * *

During the last fiscal year, American ships carried 14.6 per cent of the ocean-borne exports of the United States, as measured by value, against 12.9 per cent in 1915-16, and only 8.1 per cent in 1913-14, the year immediately preceding the war. Of the total net tonnage cleared from American ports in foreign trade during the 12 months ended last June, 36.7 per cent was of American registry. This compares with 34.1 per cent in 1915-16, with 28.6 per cent in 1914-15, and with but 25.5 per cent in the years 1913-14.

Losses Sustained by British Shipping

Week ended	Ships over 1600 tons	Under 1600 tons	Total
Mar. 4	14	9	23
Mar. 11	13	4	17
Mar. 18	16	8	24
Mar. 25	18	7	25
Apr. 1	18	13	31
Apr. 8	17	2	19
Apr. 15	19	9	28
Apr. 22	40	15	55
Apr. 29	38	13	51
May 6	24	22	46
May 13	18	5	23
May 20	18	9	27
May 27	18	1	19
June 3	15	3	18
June 10	22	10	32
June 17	27	5	32
June 24	21	7	28
July 1	15	5	20
July 8	14	3	17
July 15	14	4	18
July 22	21	3	24
July 29	18	3	21
Aug. 5	21	2	23
Aug. 12	14	2	16
Aug. 19	15	3	18
Aug. 26	18	5	23
Sept. 2	20	3	23
Total	526	175	701

Goods exported in American ships in the last fiscal year reached a total value of $795,000,000, compared with $490,566,000 in 1916 and $166,055,000 in 1914. These figures show a gain of 62 per cent in the 1917 total over 1916 and of 378 per cent over 1914. Over the same period the value of exports carried in foreign bottoms increased from $1,861,735,000 to $4,640,378,000, or something less than 140 per cent. The following table shows the proportion of the total ocean-borne export trade carried in vessels of various nations during the last fiscal year with comparative figures for 1913-14:

Nationality	1913-14, per cent	1916-17, per cent
American	8.1	14.6
Austrian	1.7	...
Belgian	0.6	1.1
British	57.8	52.6
Dutch	4.1	2.3
French	3.1	5.0
German	13.3	0.01
Italian	1.9	3.2
Japanese	1.2	4.4
Norwegian	3.2	6.8

The total net tonnage cleared in 1916-17 is reported by the department of commerce as 52,070,070, compared with 52,423,008 in the preceding year, and 53,783,409 tons in 1913-14. The greatest decline was in the trade with Europe, where clearances last year were 18,890,778 net tons, against 19,926,665 tons in 1915-16 and 20,046,191 tons in 1913-14, and possibly due to the submarine campaign.

The following table shows the record of tonnage cleared over a period of years, and brings out clearly the gain by American ships:

	American	Foreign	Total
1913-14	13,740,628	39,442,781	53,783,409
1914-15	13,418,282	33,466,806	46,885,088
1915-16	17,902,068	34,520,940	52,423,008
1916-17	19,145,754	32,924,316	52,070,070

* * *

The shipping board has been working on a plan to divert foodstuffs for export to southern ports, reserving for northern ports the problem of forwarding munitions and other war exports. Foodstuffs would be diverted to south Atlantic and gulf ports, such as Charleston, Savannah, New Orleans, Port Arthur and Galveston. B. L. Winchell, traffic manager of the Union Pacific railroad, has been mentioned for the post of director general of traffic to work out the plan.

How Wooden Ships Are Built—V

Details of Frame Construction Are Presented in This Installment Together With Data on Preparing the Ways and Laying the Keel

By H. Cole Estep

WE NOW come to the consideration of construction procedure, to the details of which the remaining articles in this series will be devoted. Laying the keel is popularly supposed to be the first step in the construction of any vessel, be it wood or steel. As a matter of fact, it is not the first operation to be performed. Before the keel can be laid, the ways must be prepared and the keel blocks assembled in their proper position. The first step, therefore, in actually building a wooden ship, consists in preparing the ways or foundation for the keel blocks. In European shipyards, the building slips or ways frequently are paved with stone in order to insure a permanently smooth, true surface. In such cases large blocks of wood are let into the masonry and the keel blocks, shores, etc., where necessary, are bolted or spiked to these blocks.

In American yards it is not considered necessary to pave the building slips. In fact, in most wooden shipyards, the amount of work involved in preparing the ways is comparatively slight. If solid ground is available on which the blocks may be laid, it is simply necessary to grade the site to a comparatively true surface. It is, of course, better in such cases if the ground slopes properly. If the ground has no slope it is necessary to build the blocks up rather high under the forward end of the vessel in order to give the proper declivity to the launching ways.

If the ground is sufficiently solid, the keel blocks can be laid directly on the earth, which in some cases may be tamped a trifle. If the ground is soft or if it has been recently filled, piles must be driven to support the weight of the ship under construction. In some cases, particularly on the Pacific coast, as previously mentioned, the entire building slip rests on piles which may be driven out over the water to a considerable distance. In cases where this is done in salt water, more or less frequent repairs will have to be made to the foundation. It is better, therefore, where possible, to lay the keel blocks on dry land.

Arrangement of Keel Blocks

The keel blocks usually are arranged as shown in Figs. 53 and 54. The structure, it will be noted from these illustrations, consists simply of blocks about 16 inches square and 6 to 8 feet in length, piled between 2 x 12-inch planks which run parallel to the keel. From two to three planks are placed between each layer of blocks. The planks give the structure what little longitudinal stability it needs.

The blocks are laid to the proper declivity by stretching a cord between fixed points, the correct height of which have been determined either by direct measurement or means of a civil engineer's level. Most authorities state that the keel blocks should be laid to a declivity of ⅝ inch per foot. On the Pacific coast, in most cases it has been found this is not enough to get the vessel properly started down the ways. In one case it took 20 men half a day to get the ship started after the launching should have taken place. Most western ship builders today are laying their blocks to a grade of ¾ inch or 1 inch per foot.

It should be remembered that when the ship is launched her after part is raised by the bouyancy of the water and if proper care is not taken in arranging the declivity of the keel blocks, the forefoot may touch the ground when the ship has reached the end of the ways. In some cases, to prevent this it has been found necessary to excavate or dredge the lower end of the slip after the vessel is finished.

In preparing the building slip, therefore, there are three important considerations to be kept in mind. They are as follows:

1.—To provide sufficient space between the ship and the ground for performing all the building operations at the keel and bilges.

2.—To leave sufficient space between the ground and bilges, and one-sixth the breadth of the ship at each side of the keel for fitting the ground ways, and for driving in the wedges which tighten the cradle under the ship, so as to support her after the shores and blocks are knocked away.

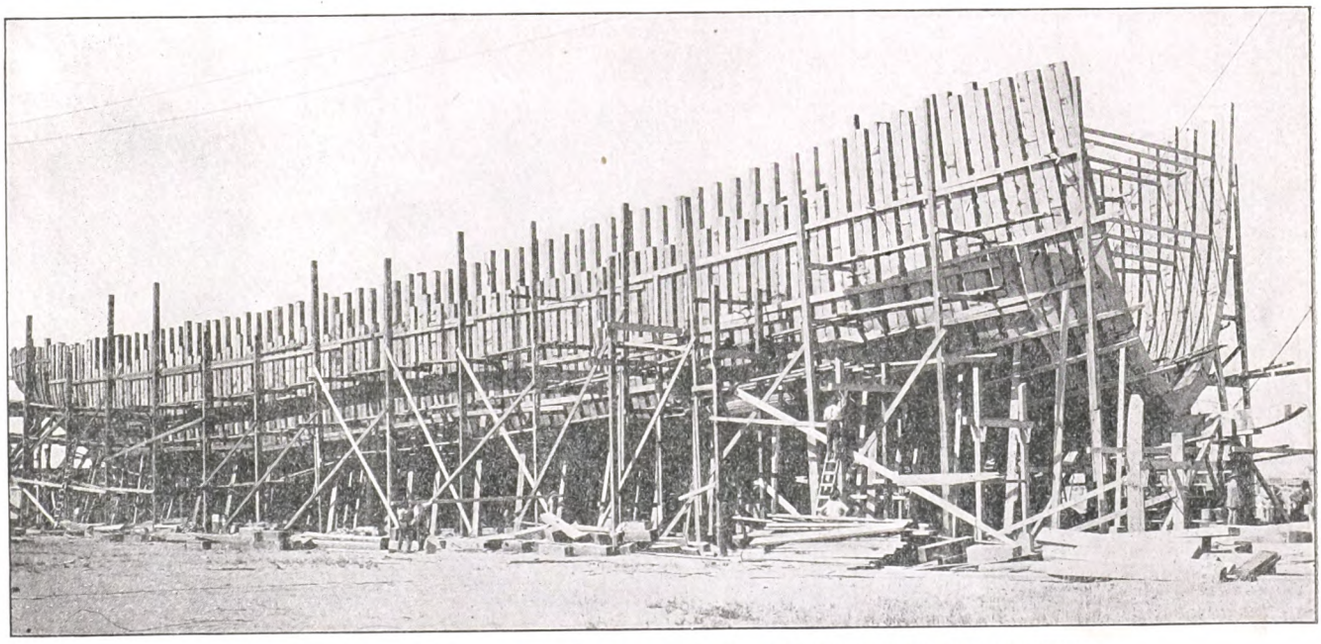


FIG. 46—FRAME OF A TYPICAL WOODEN VESSEL NEARLY READY FOR PLANKING

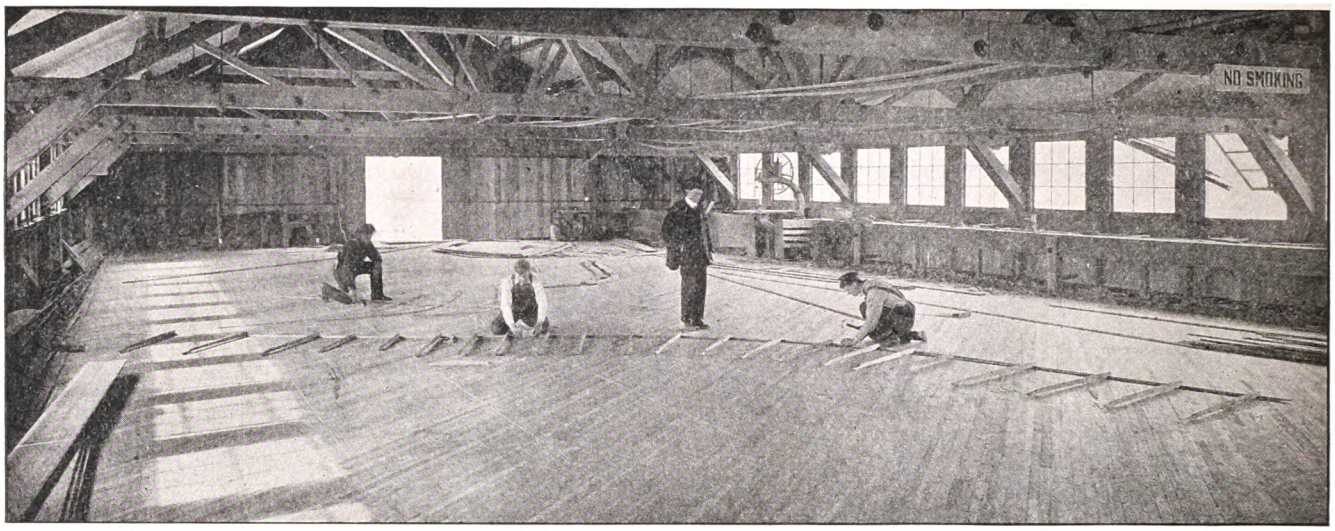


FIG. 47—LAYING-DOWN THE LINES OF A SHIP ON THE MOLD-LOFT FLOOR

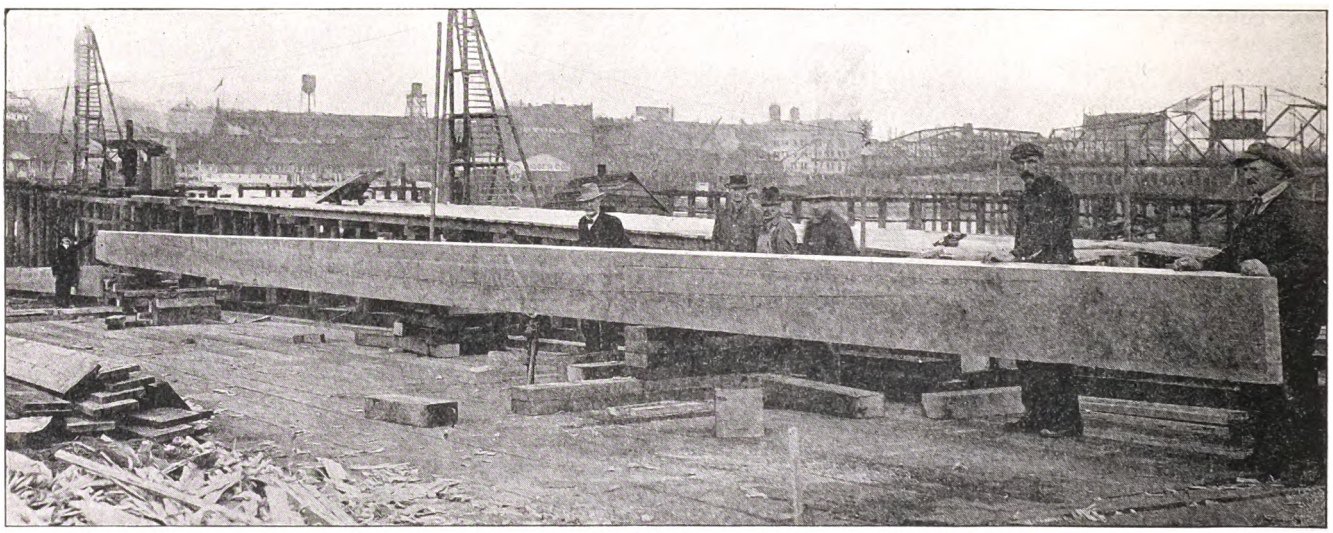


FIG. 48—LAYING THE KEEL OF A 4000-TON MOTOR SHIP

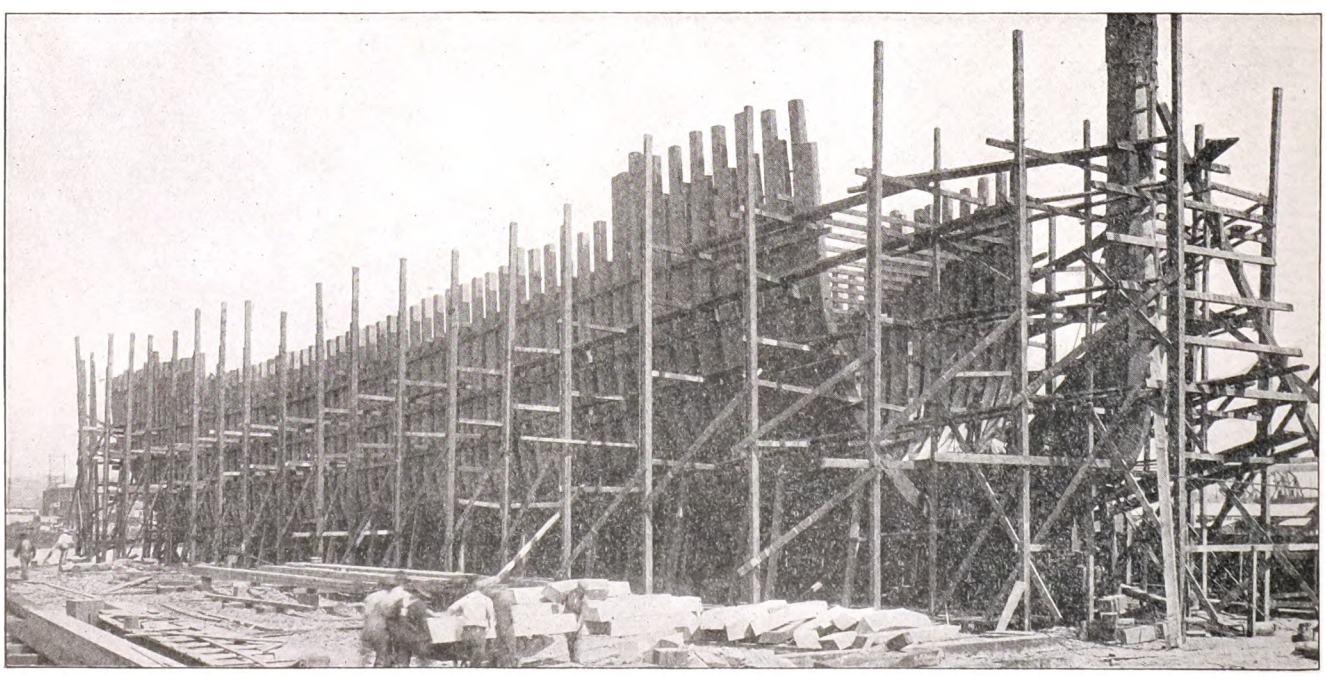


FIG. 49—FINISHING THE FRAMING OF A LARGE WOODEN SHIP ON THE PACIFIC COAST

3.—To make such an allowance for the excess, if any, in the declivity of the launching ways over that of the blocks as will prevent the forefoot of the ship from touching the ground when she has reached the end of the ways, as previously explained.

In order to obtain the required height of the foremost block with great accuracy a sketch of the ground or slip upon which the ship is to be built should be made in elevation and section, and two pieces of cardboard should be cut, one to the shape of the transverse and the other to the longitudinal section of the ship, both drawings and cardboards being on the same scale. By placing the cards on the sketches and trying them in various positions, all risk of error in deciding the height of the foremost block can be avoided.

The launching ways usually are set at a greater declivity than the keel blocks and the amount that the forefoot of the ship falls below the line of the blocks when it reaches the lowest part of the slip can be found by a simple mathematical calculation. Clearance between the forefoot and the ground should not be less than 9 to 12 inches. Now in the case of a ship built on a slip 300 feet long, on blocks at an inclination of ⅝ inch to a foot, and launched at ¾ inch to a foot, it is evident that the bow falls ⅛ inch below the line of the blocks for every foot the ship slides down the ways. Hence, in the 300 feet, there is a total relative fall of 37½ inches, and therefore, the foremost block, if at the head of the slip, must be kept 37½ inches plus 12 inches, or 49½ inches above a line, which, at an inclination of ⅝ inch to the foot just touches the after end of the ship.

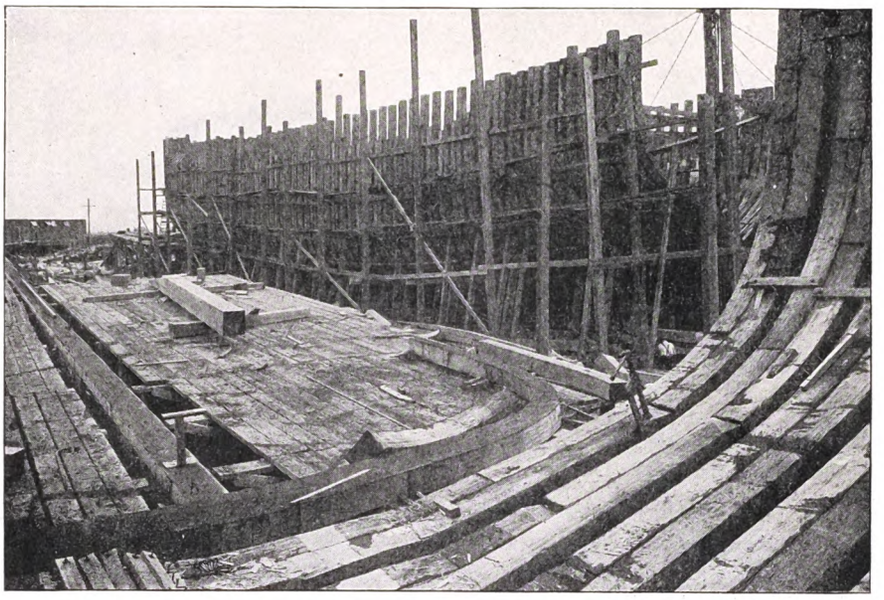


FIG. 50—FRAMING STAGE LAID ALONGSIDE KEEL—THE FRAMES ARE HOISTED INTO POSITION BY MEANS OF A SIMPLE TACKLE

From these data the foremost block can be readily built to its correct height. In order to lay the other blocks, instead of using the string or cord previously mentioned, a declivity batten may be prepared. This is a batten about 20 feet long, the edges of which are straight and inclined to each other at an angle equal to the required declivity of the blocks. Now put up a block at 20 feet abaft the foremost one to such a height as will cause the upper edge of the batten to be level, as indicated by a spirit level, while the lower edge rests upon the two blocks. These two blocks will now have the proper declivity with reference to each other.

The other blocks are laid in a similar manner, or by sighting them with the two first placed, and when this is done they can all be proved by stretching a line along their upper surfaces or by trying the declivity batten along the whole range of blocks.

After the blocks are laid out, in some yards they are secured to the ground by nails, dogs, etc., and if necessary, to each other. Spur shores also are recommended, reaching from the foreside of each block near the ground to the upper part of the after side of the one in front of it, in order to prevent the blocks from tripping, a casualty which has at times occurred when such precautions have not been taken.

The keel rests on short blocks about 10 inches thick which are supported on wedges as shown in Fig. 55. These wedges serve a double purpose. They make it easy to bring the blocks exactly up to the line so that each pier supports its proper proportion of the weight and in addition, when the ship is to be launched they may be readily knocked out of position with a sledge.

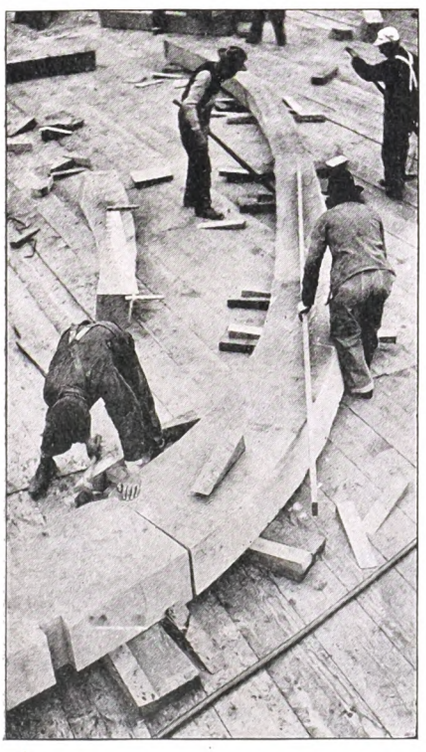


FIG. 51—ASSEMBLING FRAME FUTTOCKS ON FRAMING STAGE

FIG. 52—RESAWING FRAME JOINTS TO A PROPER FIT

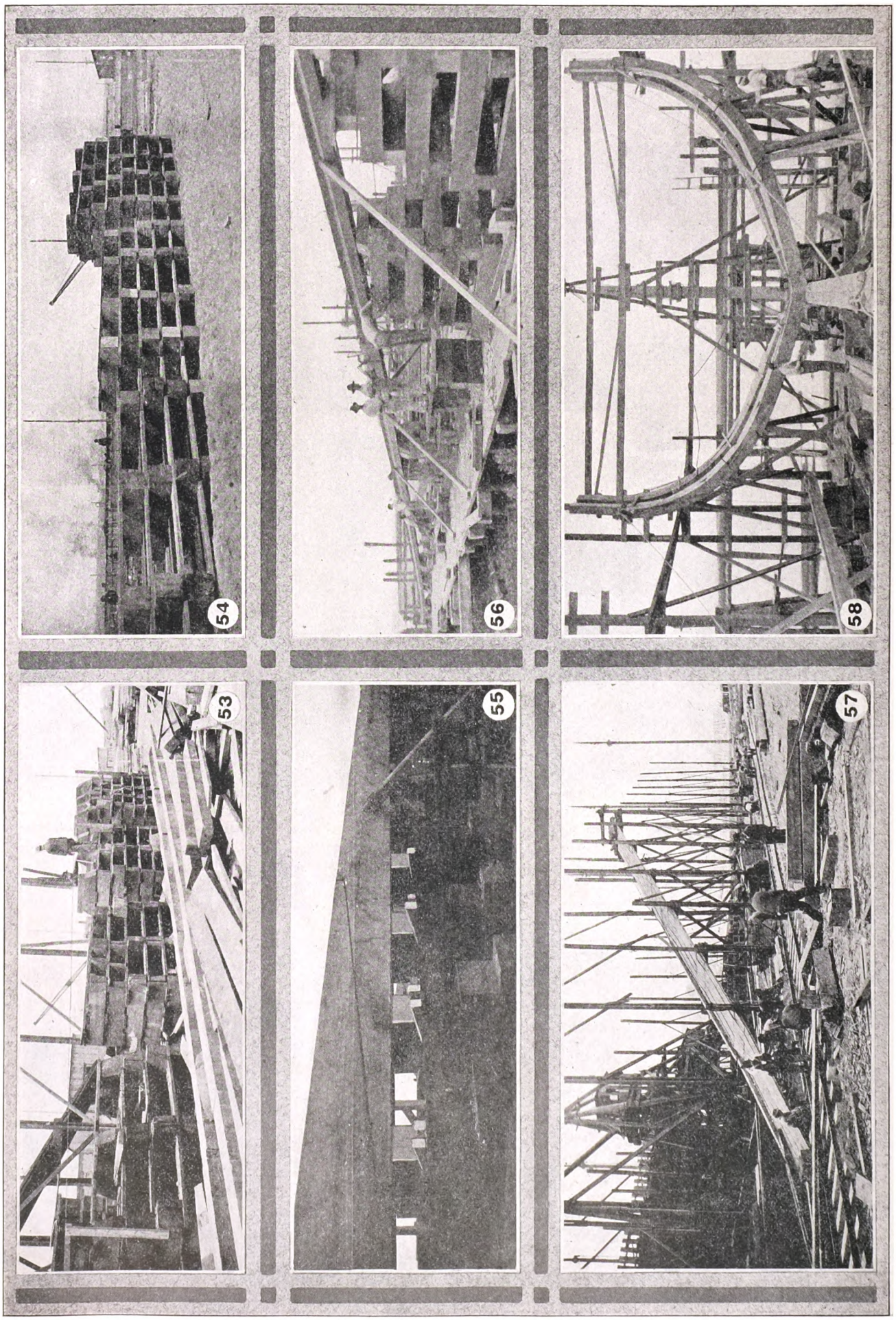


FIG. 53—SETTING KEEL BLOCKS TO THE PROPER HEIGHT FIG. 54—SETTING KEEL BLOCKS ON SAND FIG. 55—KEEL WEDGED IN PLACE ON KEEL BLOCK FIG. 56—LAYING THE KEEL IN A SOUTHERN SHIPYARD FIG. 57 SCAFFOLDING ARRANGED ALONGSIDE KEEL BLOCKS FIG. 58—KEEL NEAR STERN

FIG. 59—FRAME TIMBERS AND MOLDS FIG. 60—MARKING FRAME TIMBERS FIG. 61—CUT-OFF SAW FOR FRAME TIMBERS FIG. 62—BAND SAW FOR SHAPING FRAME TIMBERS FIG. 63—A FRAME FUTTOCK AFTER LEAVING THE BAND SAW
FIG. 64—GENERAL ARRANGEMENT OF FRAMING STAGE

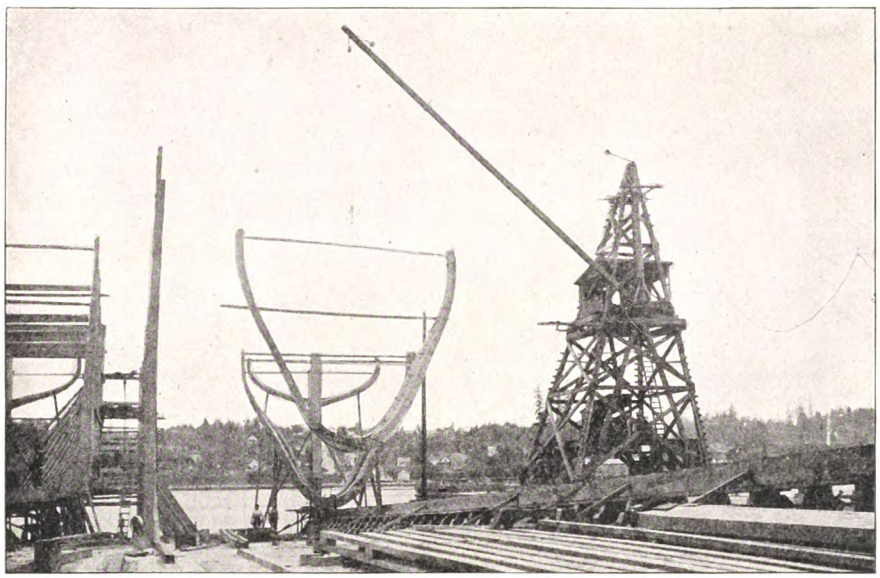


FIG. 65—SETTING FRAMES BY MEANS OF A TRAVELING CRANE

After the site is prepared, the work of arranging the keel blocks and the preparations for laying the keel should take less than a week. The actual laying of the keel for a 300-foot boat can be accomplished in a day or two. In some yards, the blocks are piled up crib fashion as shown in Fig. 56, which illustrates the method employed in a wooden shipyard in Georgia.

Getting Out the Keel

The keel is made of long pieces of selected timber similar to that shown in Fig. 48. On the Pacific coast these pieces can easily be obtained in lengths up to 100 feet. These extra long lengths, of course, reduce the number of joints or scarfs. In order to preserve their continuity as much as possible, the various sections of the keel are scarfed together as shown in Fig. 55. These scarfs may be from 10 to 20 feet in length. The two pieces, of course, are thoroughly bolted together at the scarf. The joints of the scarf frequently are laid in carbolineum to prevent decay and also to resist the action of the sea animalculæ. As soon as the keel is laid, its alignment is secured against disturbance by means of sway braces spaced every 30 or 40 feet, as shown in Figs. 55 and 56. The brace used in Fig. 55 is 6 inches square.

After the keel pieces are laid on the blocks and fitted together, the whole is sighted and proved to be straight. When this is accomplished, the keel is secured in the correct position by driving short treenails to the blocks close against the side of the keel. All of the bolts are now driven through the keel scarfs. The positions of the frame stations are next transferred to the keel, after which it is ready to receive the frames and to be joined to the stem and stern posts.

In order to prevent any water which may find its way into the joints of the keel scarfs from getting behind the garboards, a stopwater may be placed in the joint of the scarf. This stopwater consists simply of a plug of soft pine driven tightly into a hole bored right through the joint. The expansion of the plug, when immersed, prevents water from going up through the scarf and getting behind the bottom planking.

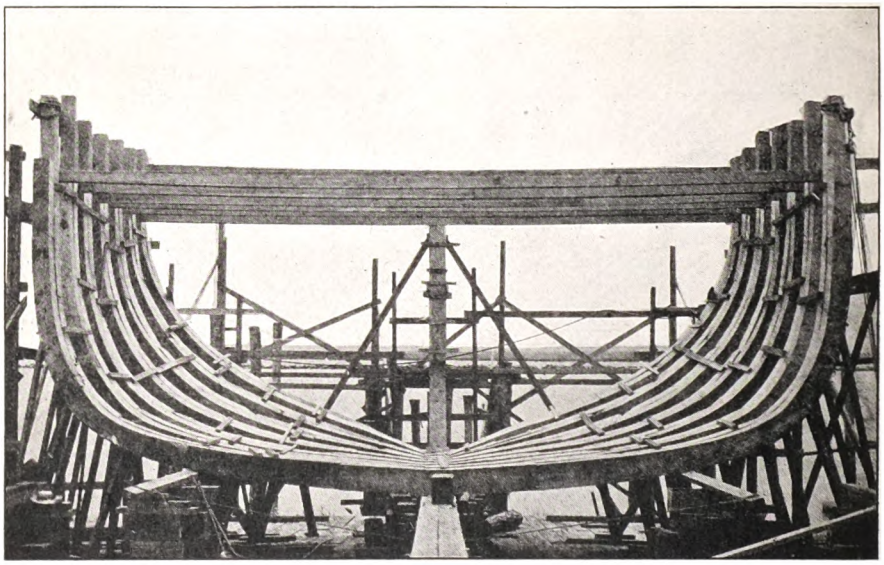


FIG. 67—FRAMES RAISED, READY FOR PLUMBING AND HORNING

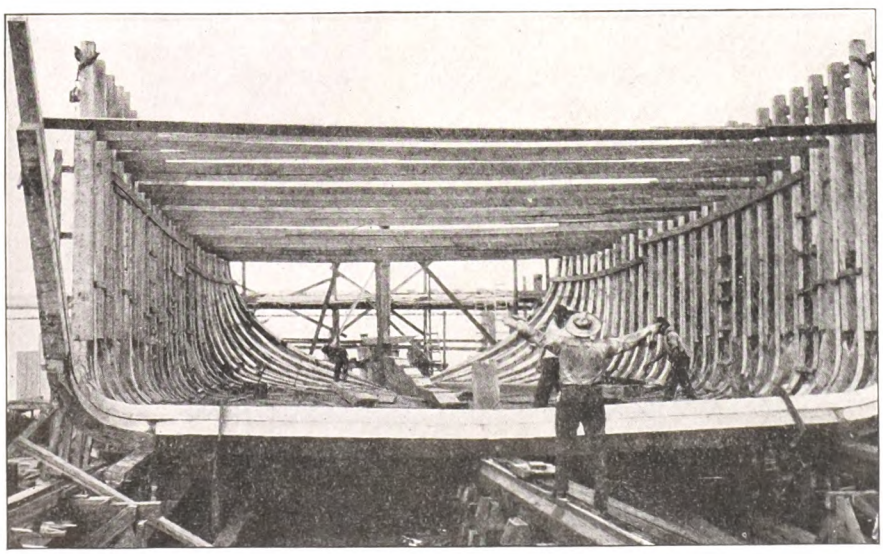


FIG. 66—RAISING FRAMES BY MEANS OF BLOCK AND TACKLE

We now take up the question of preparing the frames and placing them in their proper positions on the keel. The framing is one of the most important parts of the ship's structure, which consists, essentially of nothing more than a series of transverse ribs covered with a longitudinal series of planks which bind the frames together and keep out the water. The frames usually are spaced at equidistant intervals, the length of which is known as a "room and space." The length of the room and space is fixed by the designer. On

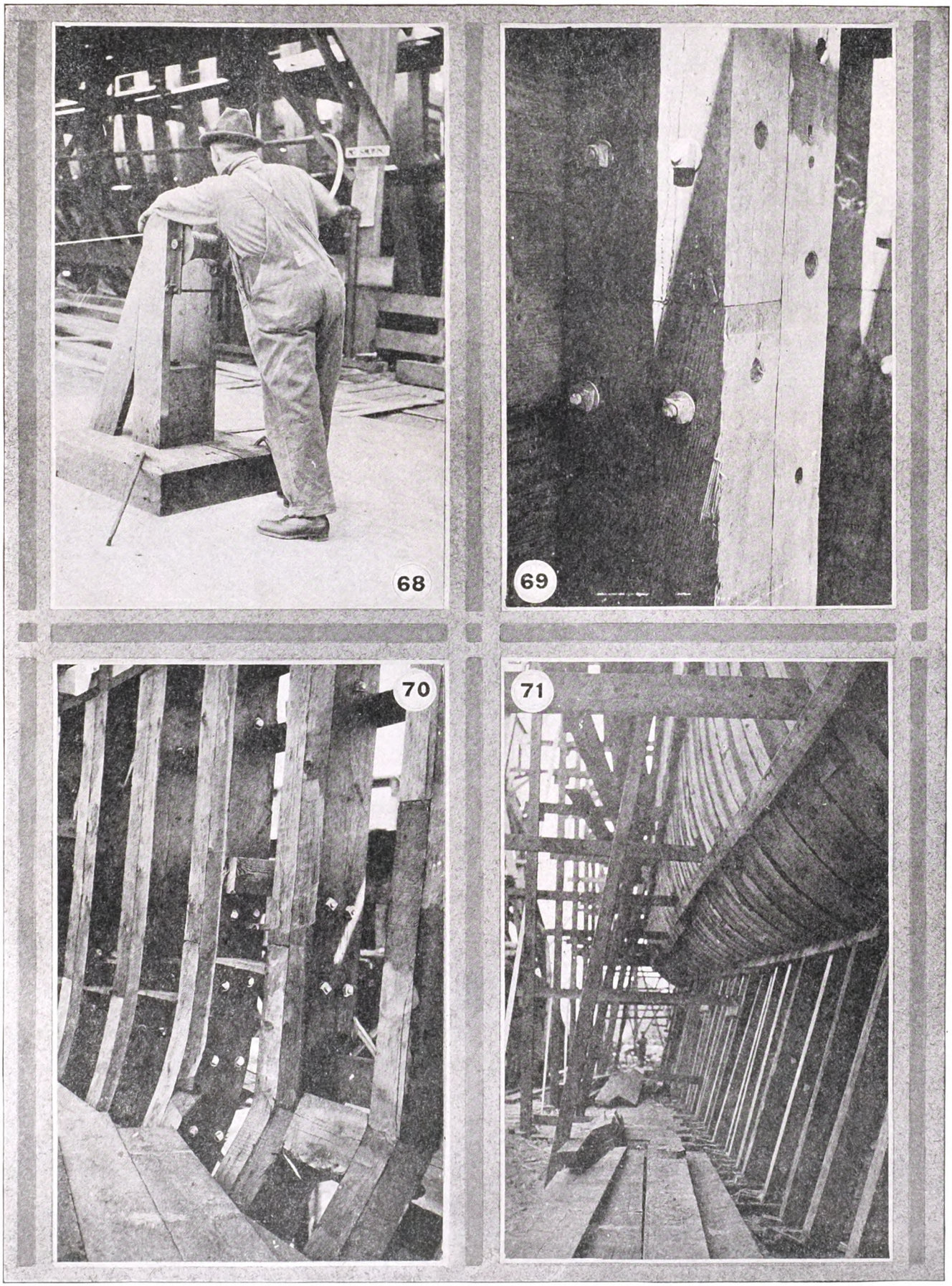


FIG. 68—HAND-WINCH FOR HAULING TIMBERS THROUGH BAND SAW FIG. 69—DETAIL OF BOLTED FRAME JOINTS
FIG. 70—ANOTHER VIEW OF BOLTED FRAME CONSTRUCTION FIG. 71—RIBBANDS IN PLACE AND SHORING UNDER FRAME

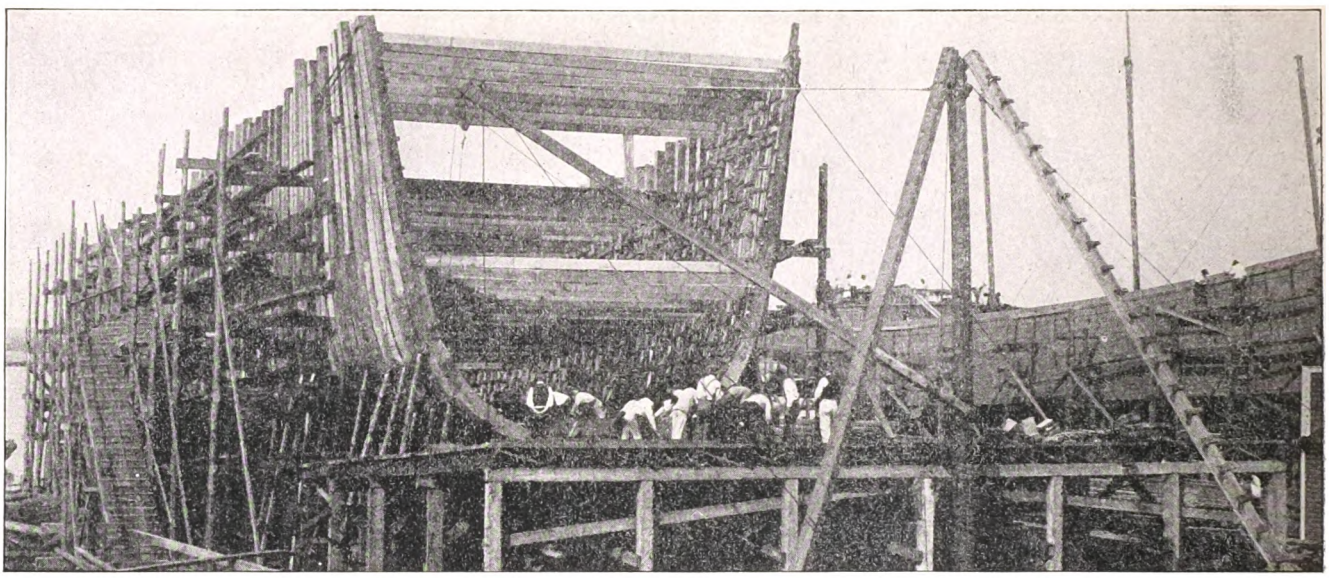


FIG. 72—FRAMING STAGE IN A GEORGIA SHIPYARD

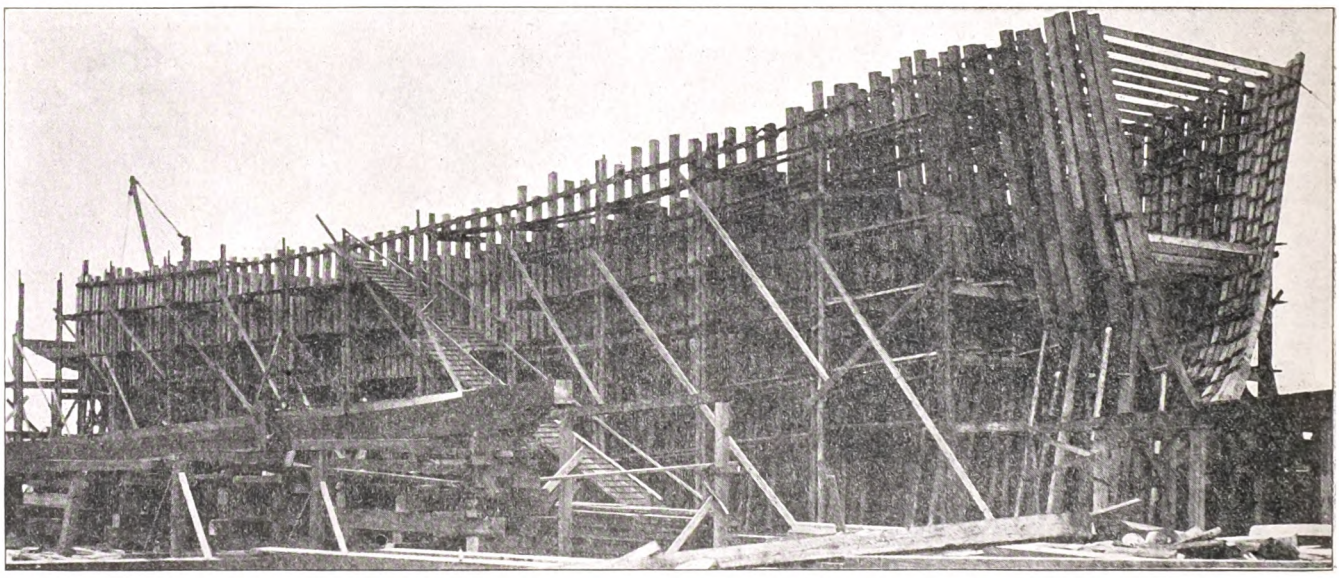


FIG. 73—FRAME OF A VESSEL IN A GEORGIA SHIPYARD

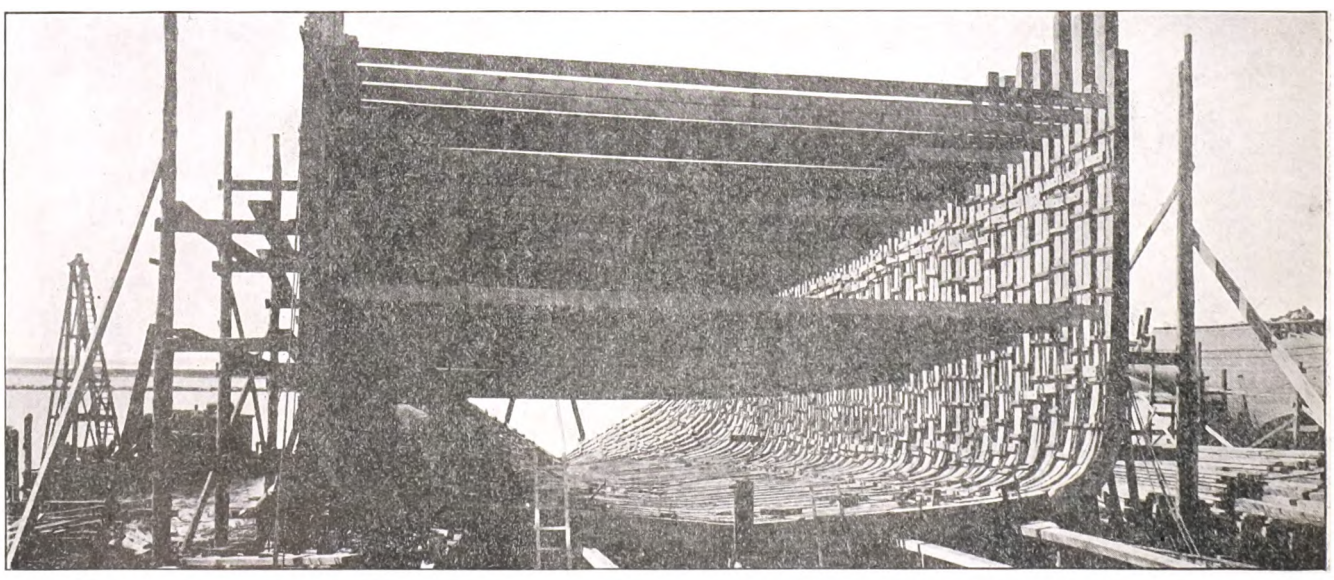


FIG. 74—TWO SETS OF CROSS SPALLS SOMETIMES ARE USED TO HOLD THE FRAME SECTIONS TOGETHER

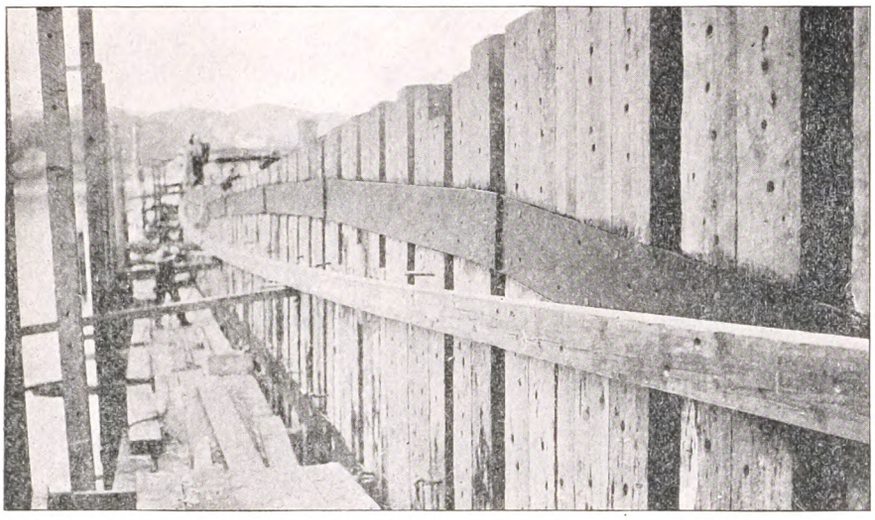


FIG. 75—UPPER PART OF ARCH STRAPPING

account of the great curvature of the transverse sections of the vessel, especially amidships, it is necessary to build the frames of a number of pieces and in order that these may be united as rigidly as possible, they are disposed in two sets, the butts of which give shift to each other, the whole being so combined that its elements will yield mutual support in the most efficient manner obtainable.

Preparing the Molds

The proper curves or molds for the frame sections are provided by the mold loft, where the sheer-draft or lines of the vessel are laid down full size. Fig. 47 shows a view of a mold loft, indicating how the lines are laid down for the preparation of the molds. The mold loft should be big enough so the longitudinal or sheer-plan of the vessel can be laid down in at least two sections. In many cases, however, it is necessary to lay down the ship in three sections.

A sheer-draft, as the lines of the vessel frequently are called, usually is prepared in the drawing room to a scale of ¼ inch to the foot. When this is copied to full size on the mold-loft floor, it may be found that errors, almost inappreciable in the quarter scale drawings are very apparent when magnified 48 times. It is usually found, therefore, that the three sets of lines, namely, the sheer-plan, body-plan, and half-breadth plan, disagree sufficiently to prevent the various problems of laying off from being solved with that degree of accuracy which is necessary in order to obtain a fair surface to the vessel. Hence a fairing or correcting process has to be performed before the molds can be prepared.

As every draftsman knows, the projections of the lines of the vessel upon the three plans, sheer, body and half-breadth, are mutually interdependent and this property is utilized in performing the fairing operation. The projections of each of the sets of lines used in this process, that is the water-lines or level lines, cross sections or square sections, bow lines and diagonal lines, appear straight in one or two of the three plans, so that by the aid of a straightedge they can be drawn fair easily in such plans. Now the property which a wooden or metallic batten has of bending in a fair curve is brought into play in drawing the lines fairly in the plans where they appeared curved. Since the intersections of lines with each other are points, the points of intersection of two sets of lines in one plan are transferred to their relative positions in the others, so that points which appear straight in one plan form a curved line in another. Battens are penned or bent to pass through as many of the points as is consistent with absolute fairness and the line is drawn. Thus, by a series of interchanges between the three plans, or projections of the lines, the various lines are copied from one plan into another until at length all the plans coincide and the lines composing them are continuous curves. The fact that the curves are continuous proves that the body is fair.

It is a great advantage if the seams of the boards forming the floor of the mold loft are perfectly straight and parallel, as they thus afford considerable assistance in the several processes of squaring and drawing parallel lines which are involved in the practice of laying-off.

Transferring Lines to the Floor

The first thing to be done in copying the lines onto the mold loft floor is to strike a base-line. If the edges of the boards are arranged as suggested, it will be necessary to place the base-line either parallel or perpendicular to the lines of seams. Should the floor be rectangular, about two feet from the wall or other boundary of the floor is a convenient position for a base-line. After the base-line is drawn, the depth of the keel, the lower edge of planking, and the upper side of the keel are set off from it at distances measured from the sheer-plan. Also the fore and after-edges of the stem together with the fore-edge of rabbet or stem, which is, of course, a continuation of the lower edge of planking on the keel, are laid off. The sternpost is next copied with the after-edge of its rabbet and the various square stations, or frame stations in the sheer-plan are laid out on the floor. These, with the line of the upper deck beams at the middle, are termed the fixed lines of the sheer-plan, being unalterable except insofar as drawing them true is concerned.

To economize space, the half-breadth plan is generally drawn on the same part of the mold loft floor as the sheer-plan. The base-line of the former, or a line parallel thereto serving as the middle

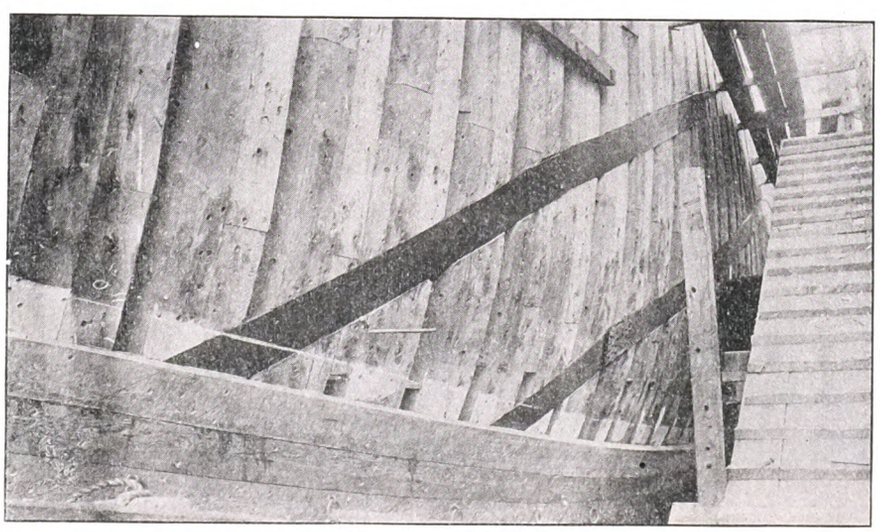


FIG. 76—LOWER PART OF ARCH STRAPPING SHOWING METHOD OF FASTENING THE BUTTS

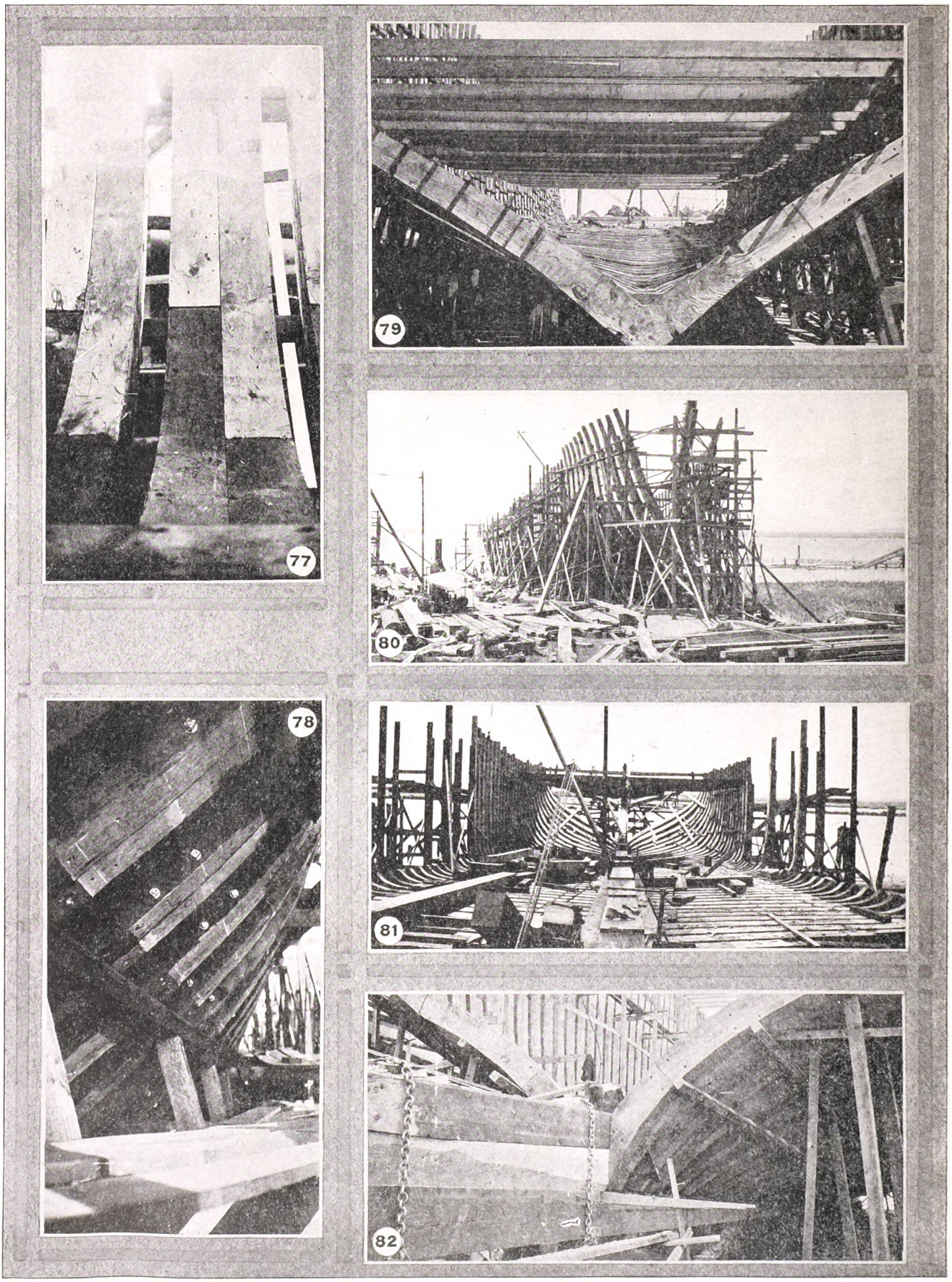


FIG. 77—DETAIL OF STANDARD FRAME CONSTRUCTION FIG. 78—DETAIL OF BOLTED FRAME CONSTRUCTION FIG. 79—FRAME NEAR BOW USING NATURAL CROOKS FIG. 80—FRAMING A SHIP IN A SOUTHERN YARD FIG. 81—SOMETIMES THE FLOORS ARE LAID FIRST AND THE SIDE FRAME PIECES RAISED AFTERWARD FIG. 82—DETAIL OF FRAMES HEELING TO DEADWOOD

line of the latter, and in this way the same square stations will do for the two plans.

Not having copied the sheer-plan, the body-plan is next copied full size as nearly as possibly to the sheer-plan. In some cases where the mold loft floor is smaller than it should be, two plans overlap. On a very small floor, the same base-line may as well serve for three plans, one of the square stations in the midship being taken as the middle line of the body-plan.

Copying the Body Plan

The body-plan is copied or drawn on the floor by measuring the distances along the several water and diagonal lines from the middle line to where they cut the square stations, setting these distances off to full size on the corresponding lines on the floor. Battens are then penned or bent as in Fig. 47 so as to approximate as closely to these points as is consistent with absolute fairness or continuity. The lines then are marked in, usually with thin slices of chalk. At some yards it is customary to measure the ordinates, etc., and record them on paper in tabulated form before proceeding to draw the body full size on the floor. In this case, the latter operation is performed without direct reference to the drawing when working on the floor.

The half-breadth plan is next to be drawn on the floor and here we again note that the lines which are curved in the body plan are straight in the half-breadth plan and *vice versa*.

Having already drawn the middle line of the half-breadth plan on the floor and the projections of the square stations in that plan, we proceed to copy the level or water lines from the body plan into the half-breadth plan. For this purpose straightedged battens are set to the middle lines of the body and half-breadth plans on the drawings. Now measure on a staff whose end is kept against the batten set to the middle line of the body-plan, the distance from this line to where a level line cuts each square station or frame station in the body-plan. Transfer these distances to the corresponding square stations in the half-breadth plan on the floor by setting the end of the staff against the middle-line batten of that plan, marking the distances out from the respective square stations. A batten is then bent so it can pass fairly through as many as possible of these points, thus transferring the water lines to the half-breadth plan.

The diagonal lines and bow and buttock lines from the sheer-draft are also transferred full size to the mold loft floor in much the same manner as just described. In fact, this process of transferring the lines to the floor is comparatively simple if the principles of projection which underlie all drafting work are thoroughly understood. To be completely successful, the mold loft man also should have a good knowledge of descriptive geometry, which covers the details of the science of projection.

As the various plans are copied on the floor it is found that there are discrepancies, as previously pointed out. These must be corrected by mutual adjustment until the three plans coincide accurately.

When discrepancies occur, the water and diagonal lines in the neighborhood must be examined to see if the points within the section were correctly taken, and if a modification of these lines, consistent with fairness, will give such points as the batten will spring to. The bow and buttock lines are a great help to both the designer and the draftsman in judging the character of the surface at the extremities of the ship. No rules, however, can be laid down for guidance in dealing with them, experience being required in order that they may afford a vivid conception of the form of the vessel.

In practically performing all of the operations connected with laying down the lines on the mold loft floor, a great deal must be left to the judgment of the man in charge. A practiced eye will save much labor. When a batten does not spring well to the point, it is bent to pass outside some and inside others. As a rule the batten should pass on the outside more frequently than on the inside of the points in order that the volume of the ship may not be less than that given by the design. In copying and drawing the body-plan, it is advisable to draw the midship section first and then the others in rotation as the draftsman is thus better enabled to see what he is doing and exercise his judgment.

Time Required for Framing

Mold loft floors usually are painted. Generally a gray color is chosen. When a new set of lines is to be laid down, it usually is advisable to repaint the floor in order to completely obliterate all of the old lines. In some cases, however, the floors are not painted, but are left in a natural color. In these yards when new lines are to be laid down, the whole floor is gone over with a cabinet scraper, thus removing the old drawing. The finished molds are similar to those shown on the pile of timber in Fig. 59. White pine, cedar, or other easily worked strips are used for making molds.

As soon as the molds are ready, the process of framing the ship actually may be begun. This process may be divided into three steps as follows: Sawing the frame sections; assembling the sections, or buttocks; and raising the frame.

The time required to frame a ship seems to vary widely in different yards. In one case the writer has been informed that 46 days were required to frame a 250-foot, 4-masted schooner. In this yard the frames were skidded into position and raised by tackle, no cranes being available. In another yard only 15 days were required to frame the square body of a 290-foot ship, using the same method of raising the frames. To this should be added 10 days for the forward and stern cant frames. A gang of about eight to 10 men is required, not including those working on the framing stage where a dozen more are necessary. After the main frames are up the smaller pieces of the stern frame, including the transom, etc., can be framed with a gang of four or five men.

Specifications of Timber Needed

The frames of modern wooden vessels are sawed from timbers similar to those shown in Fig. 59. The sizes of timbers necessary and the quantity required for framing a 300-foot vessel are indicated by the following quotation from the timber schedule for standard Pacific coast type wooden steamship, designed by Mr. Ferris for the United States Emergency Fleet Corp. The standard government boat, it will be recalled is 281 feet 6 inches in length overall and 46 feet beam. It has a cargo capacity of about 3500 tons on a draft of 23½ feet. The frame timber specifications are as follows:

Net size	Gross size	Length	No. of pieces	Feet B. M.
12 x 32	12¼ x 32	10	100	32,667
12 x 30	12¼ x 30	10	16	4,900
12 x 30	12¼ x 30	10	100	30,625
12 x 30	12¼ x 30	16	12	5,880
12 x 30	12¼ x 30	20	16	9,800
12 x 30	12¼ x 30	24	12	8,820
12 x 28	12¼ x 28	12	16	5,488
12 x 28	12¼ x 28	16	50	22,867
12 x 28	12¼ x 28	16	56	25,611
12 x 26	12¼ x 26	10	100	26,541
12 x 26	12¼ x 26	16	56	23,781
12 x 26	12¼ x 26	16	50	21,233
12 x 26	12¼ x 26	28	20	14,863
12 x 26	12¼ x 26	28	16	11,891
12 x 26	12¼ x 26	30	80	63,700
12 x 24	12¼ x 24	16	56	21,952
12 x 24	12¼ x 24	16	50	19,600
12 x 24	12¼ x 24	16*	5	2,940
12 x 20	12¼ x 20	12	50	12,250
12 x 20	12¼ x 20	16	56	18,293
12 x 16	12¼ x 16	12	56	10,976
12 x 16	12¼ x 16	12	50	9,800
12 x 16	12¼ x 16	14	80	18,293
12 x 12	12¼ x 12	16	80	15,680
10 x 24	10¼ x 24	16*	5	2,400

*And up, average 24 feet.

It also may be interesting to note that the timber required for frames Nos. 35 to 60 in the 5-masted motorschooner, the details of which were presented in Figs. 36 and 44, in the chapter published in the September issue of THE MARINE REVIEW, are as follows:

13 pieces..... 12 x 28 — 40
13 pieces..... 12 x 20 — 30
39 pieces..... 12 x 26 — 32

13 pieces	12 x 22 — 22
13 pieces	12 x 25 — 34
20 pieces	12 x 22 — 36
16 pieces	12 x 18 — 40
10 pieces	12 x 18 — 42

Forward Cant Frame No. 92

1 piece	12 x 26 — 24
1 piece	12 x 28 — 36
1 piece	12 x 24 — 22
1 piece	12 x 20 — 28
1 piece	12 x 28 — 24
1 piece	12 x 16 — 28

One method of marking the frame timbers with the molds is shown clearly in Fig. 60. A man of some experience is necessary for this operation and a good workman can save considerable lumber at this point. After the frame timbers have been properly marked, they are ready to be sawed and for this purpose sawing equipment such as that illustrated in Figs. 61 and 62 may be employed. The equipment shown in Fig. 61 consists of a 48-inch swinging cut-off saw and a steam-driven derrick with a 45-foot boom. As soon as the timbers are marked, as shown in Fig. 60, they are picked up by the derrick and swung around to the cut-off saw table as indicated in Fig. 61. After being sawed to the proper length, they are skidded out onto the horses shown at the extreme left in the background in Fig. 61. They are then transferred from the horses to dollies or timber trucks similar to those shown in Fig. 62. These dollies are used to shift the timbers to the band-saw.

Roughing Out the Timber

A 40-inch bandsaw is provided. The frames are sawed to the proper curved outlines in the band-saw, the finished sections or futtocks appearing as in Fig. 63. This also shows the type of truck used for transferring the finished frame sections from the band-saw to the framing stage where the frames are assembled. In some yards, in order to assist the work of sawing, small hand winches, such as that shown in Fig. 68, are employed. This apparatus saves considerable labor. It is particularly useful in sawing bevels on long straight pieces. For sawing out the frames of a 300-foot vessel, a gang of seven to nine men, using the equipment just described, is employed. It takes such a gang about nine weeks to saw out the 100 frames in the ship. If the gang turns out four complete single frames in an 8-hour shift, a good day's work has been accomplished. If greater speed is desired, more men and equipment must be employed.

After the frame sections are sawed out, they must be assembled. This operation is shown in Figs. 51, 52 and 64. The framing stage of a southern shipyard also is shown in Fig. 72. The framing stage, on which the various sections are assembled, is located usually at the head of the building slip. Sometimes, as in Fig. 50, it is built right alongside the keel so that the assembled frames do not have to be moved before they are rolled up into place. Preferably, however, the framing stage should be level. At all events it should have a plane surface. As shown in Fig. 51, wedges are used to bring the various sections or futtocks to proper alignment. The joints, it will be noted, do not fit exactly. They, therefore, are resawed using cross-cut saws as shown in Fig. 52. This illustration shows the frame after the doubling frame is in place. The several futtocks must be fastened together before the frame is hoisted into place. Usually wooden treenails, such as those shown at the left in Fig. 64, are utilized for this purpose. The tops of the frames also are tied together by means of cross spalls. Single pieces of 2 x 6-inch timber usually are employed for this purpose.

After the frame has been assembled as shown in Fig. 64 it must be raised into position. Various methods are employed. Perhaps the most rapid and efficient is that illustrated in Fig. 65, using the traveling derrick described in the chapter published in the August issue of THE MARINE REVIEW. As this illustration indicates, the derrick readily picks up the frame and takes it down to its proper position on the keel. The derrick also is of advantage in the plumbing and horning operations. As soon as the frame is secured in place, it is fastened to its neighbor by means of light tie pieces and small bolts as shown in Fig. 50. Groups of frames when they are erected, are later tied together by ribbands as shown in Figs. 71 and 78. The derrick shown in Fig. 65 is at the plant of the Sloan Shipyards Corp., Olympia, Wash.

When the services of a derrick or crane are not available, the simpler method of rolling the frame into position by means of tackle as shown in Fig. 66 may be employed. This method of raising frames is employed in the yard shown in Fig. 50. This illustration shows clearly how the frame is hoisted into position using tackle fastened to the upper ends of frames already raised.

Southern Practice

A good view of a set of frames after hoisting is shown in Fig. 74. This illustrates the practice of a Georgia yard. It will be noted that two sets of ties are used to hold the frames together. Another view of the frame construction of a wooden motor schooner built in the same yard is shown in Fig. 79. This shows how natural crooks are employed to strengthen the frame members near the bow. It must be admitted that these frames are stronger than those which are merely sawed out. There is not, however, enough timber of suitable character available to permit any large number of ships being built in this country in the manner shown in Fig. 79.

Detailed views of modern methods of fastening sawed frame futtocks together are shown in Figs, 69, 70, 77, and 78. The standard Pacific coast and Gulf construction is shown in Fig. 77. These frames are sawed out as previously described and as the illustration just mentioned indicates, the futtocks are fastened together by wooden treenails and drift bolts. Other shipbuilders, notably Fred A. Ballin, Portland, Oreg., use the bolted construction illustrated in Figs. 69, 70, and 78. Two bolts are carried through each end of the futtock forming a solid joint.

Further Construction Details

Further details of methods of shoring up frames after they are erected may be obtained from a study of Fig. 71. These shores are 6 inches square and it will be noted they are wedged to a bearing. The ribbands which hold the frames together temporarily are about 4 inches square and are spiked once to each frame. They are, of course, removed when the planking goes on. Wedges driven by hand mauls usually are employed for this purpose. In some cases, 6 x 6-inch ribbands are used. As a matter of fact, their exact dimensions are of no consequence. Neither is it necessary that they follow the diagonal lines as some old-line shipbuilders stipulate. Their sole purpose is simply to hold the frames together temporarily.

In setting frames, it is customary to start at the after end of the boat as shown in Fig. 65. Sometimes, however, the after cant frames are omitted, the square body being framed up first. In other yards, particularly in the south, the floors are first laid, and some of the keelsons bolted down, after which the side futtocks of the frames are set in place as shown in Fig. 81.

The frames, of course, cannot be secured by ribbands until the builder is sure they are set square with the keel and with each other. The following method may be employed to determine whether or not the frame is vertically square to the keel. Drop a plumb from the middle of the cross spall to the floor. Then measure the thickness of the cross spall from the joint of the frame, and set off this distance from the joint on the floor. The plumb should fall as much abaft this point as is given by the product of the declivity of the keel blocks per foot by the number of feet in the height of the cross spall above the floor. Of course, this is on the supposition that the frames are to be square to the keel which is true al-

(*Concluded on page* 383.)

American Ship Yard Activities

A Snappy Summary of the Leading Events of the Month in the Vessel Construction Field

Will Build 40 Steel Ships at Bristol

W. AVERILL HARRIMAN, through the Merchant Shipbuilding Corp., has signed contracts with the Emergency Fleet corporation for constructing what is understood to be the largest amount of steel shipping tonnage so far ordered by the corporation from any single concern. The Merchant Shipbuilding Corp. operates Mr. Harriman's new shipyard at Bristol, Pa., on the Delaware river, and this yard is to construct for the government 40 9000-ton fabricated steel freight steamers.

Mr. Harriman controls two shipbuilding corporations. He took over the Chester Shipbuilding Co., which owns and operates a yard at Chester, Pa., as a going concern, some months ago, from C. P. M. Jack, a Philadelphia engineer, who is now consulting engineer for both the Harriman companies. This yard had six ways when Mr. Harriman acquired it; it now has 10, and further extensions and improvements in its facilities are rapidly going forward. The Chester company and plant is now at work on 28 individual contracts for fabricated steel freighters, originally entered into with private individuals and shipping companies, all of which, however, have now been taken over by the Emergency Fleet corporation in its process of wholesale commandeering.

Yard Still Uncompleted

The Bristol yard, where the 40 freighters just contracted for will be built, is a new one, and, in fact, has not yet been completed. Mr. Harriman himself, having chosen the site after an inspection of a large number of other waterfront properties along the Atlantic seaboard, designed and commenced the erection of the plant. The American Bridge Co. supplied the material for the shops, ways, and it will also supply the steel for the new ships. The Bristol plant has 12 ways, and it is expected that the first keel will be laid there in about three months or less. Mr. Harriman intends to have the last of the 40 freighters in commission within 18 months or less.

The contract between the Merchant Shipbuilding Corp. and the Emergency Fleet corporation was negotiated on a different basis from previous contracts for ships entered into by the government. The Emergency Fleet corporation leases the Bristol yard, plant and facilities outright from the Merchant Shipbuilding Corp., under its terms, and employs the latter simply as its operating agent to build the ships for a fixed fee per ship, the amount of which is not made public.

The vessels, however, although generally resembling the standard steel freighters designed by the Emergency Fleet corporation, will be built to designs of the Merchant corporation. Mr. Harriman is chairman of the board. The president, R. H. M. Robinson, is one of the best known naval architects of the United States, and was formerly a naval constructor in the United States navy. He is an intimate friend and associate of Rear Admiral Taylor, chief of the bureau of construction, and himself has designed and built several battleships for the United States navy. The designs for the Merchant Shipbuilding Corp. freighters were prepared under Mr. Robinson's personal supervision, and include a number of special features not incorporated in the standard types of the Emergency Fleet corporation. They will have a speed of 11 knots.

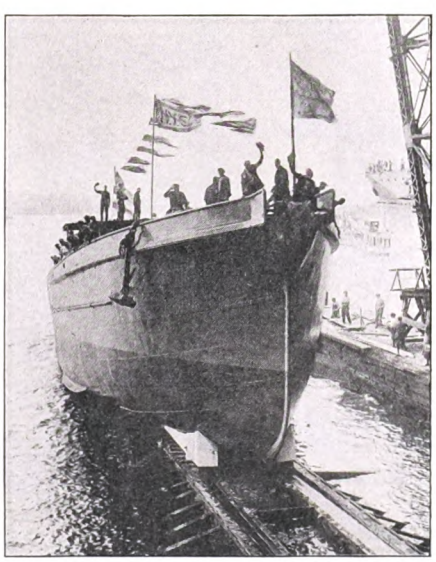


Photo by New York Shipbuilding Corp.
MINE PLANTER ORDERED SINCE WAR BEGAN

Built Since War Began

The mine planter GENERAL WILLIAM M. GRAHAM, which is shown in the accompanying illustration, was ordered since the United States declared war. The keel was laid at the yard of the New York Shipbuilding Corp., Camden, N. J., immediately after the declaration of war in April. When the mine planter was launched on Aug. 29, she was 82 per cent completed.

The GRAHAM will be followed by a large number of government-owned vessels which the New York Shipbuilding Corp. is building. These ships are not only for the navy, but for the army and for the Emergency Fleet corporation. Among these are the battleship IDAHO, which was launched late in June, 24 merchant ships for the corporation and 10 torpedo boat destroyers for the navy.

To Build Steel and Wood Ships

Capitalized at $2,100,000, the Erickson Engineering Co., one of Seattle's newest shipbuilding enterprises, has officially entered into the field. The Erickson company is incorporated by C. J. Erickson, a Seattle construction contractor; C. E. Erickson, his son, and Charles M. Barnett, and they propose to build not only wooden and steel ships, but eventually the machinery for the operation of such vessels as well.

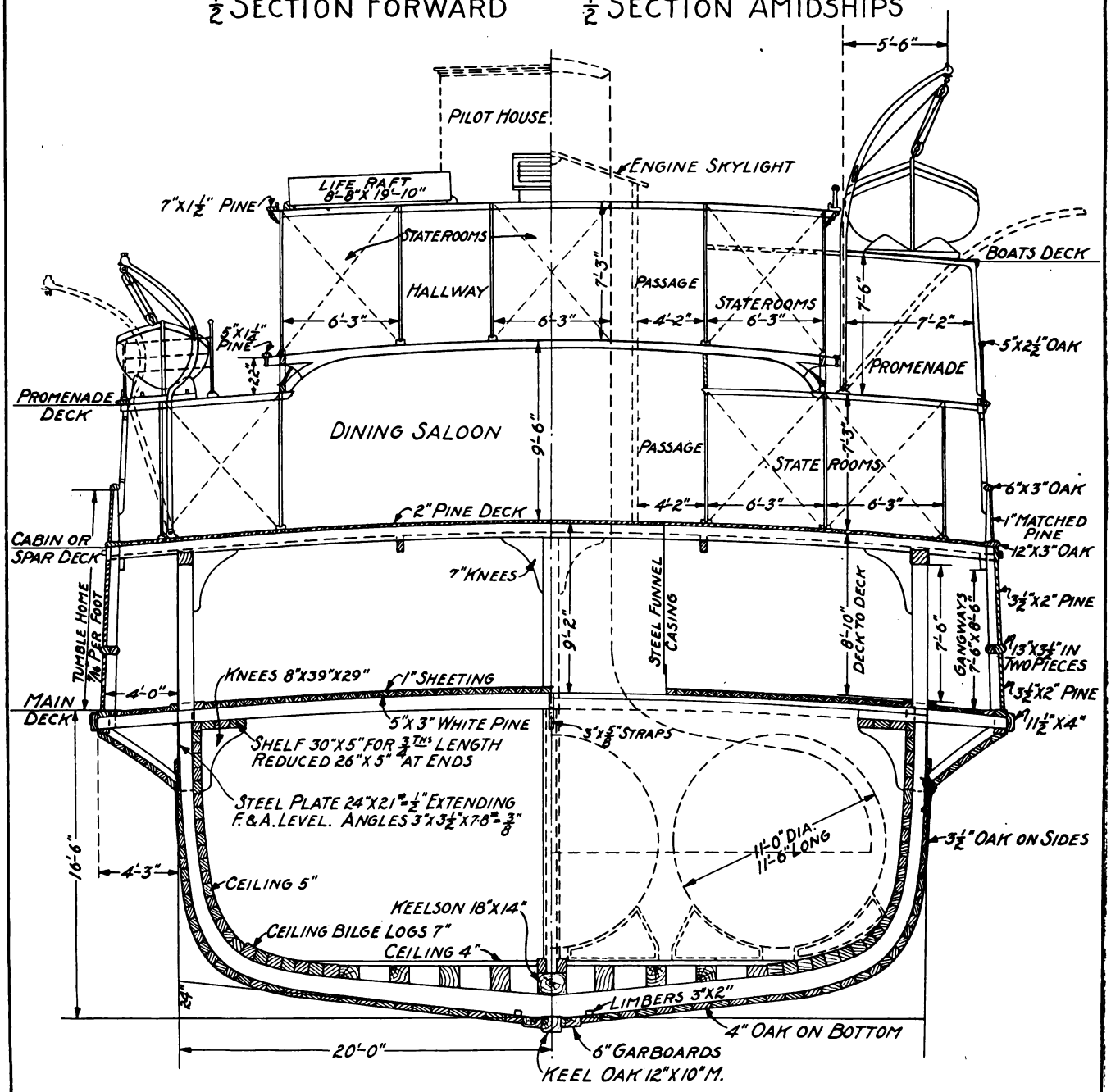
The company is preparing shipways at the Duwamish river site secured some time ago. The new yard will soon be ready for the first keel laying. Eventually the Erickson company expects to have 10 shipways in operation. Of this number, the piling already has been placed for four ways, and as soon as the woodwork is completed the keels of the first of the wooden ships to be built will be laid.

MIDSHIP SECTION

PRINCIPAL DIMENSIONS

LENGTH ON KEEL	238'-0"	LENGTH OVERALL	256'-0"
BREADTH OF HULL	40'-6"	BREADTH TO BULWARKS	48'-0"
DEPTH OF HOLD	14'-0"	DEPTH MOLDED	16'-6"

½ SECTION FORWARD ½ SECTION AMIDSHIPS



$$\frac{L\,251'\text{-}0''\times B\,38{\cdot}75\times D\,16{\cdot}08}{125} = 1011 \text{ TONNAGE NUMERALS}$$

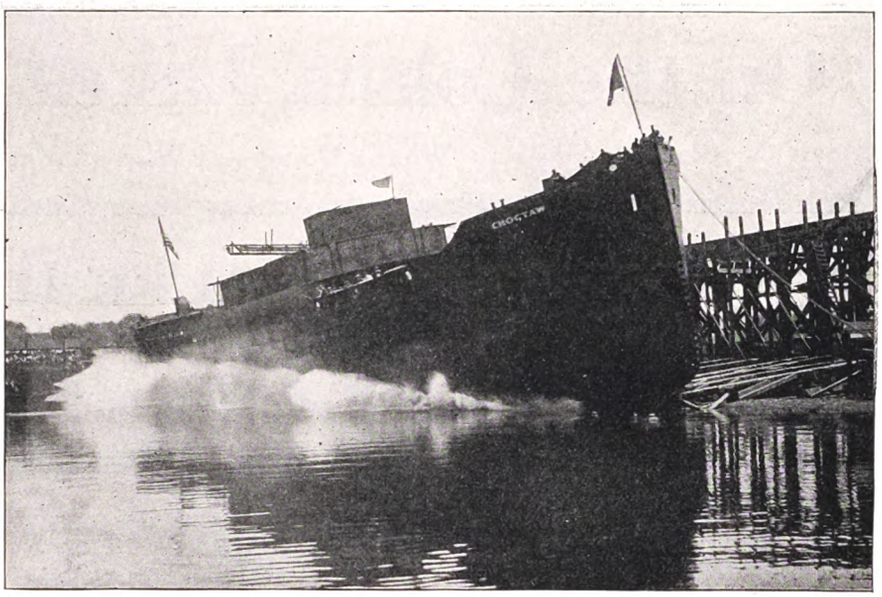
WOODEN STEAMER DESIGNED FOR GREAT LAKES

MIDSHIP SECTION OF WOODEN STEAMER DESIGNED FOR GREAT LAKES

Wooden Steamer Designed for Great Lakes

In these times when wooden shipbuilding is a subject of universal interest, the accompanying details of a wooden passenger steamer designed for Great Lakes service are of interest. The design, which was prepared by William J. Wood, naval architect, Chicago, contains some interesting features. Oak framing and planking is provided throughout. The steamer has two decks above the main deck.

The design provides for a vessel 256 feet long, 40 feet 6 inches beam and 16 feet 6 inches in depth, with a tonnage numeral of 1011. The breadth over the bulwarks is 48 feet and the length on the keel, 238 feet. The keel, which is oak, is molded 10 inches and sided 12 inches. It is laid in lengths of not less than 45 feet. The keel scarfs, which are vertical, are 54 inches long with bolts 10 inches apart clenched over washers at both ends. The stem, which is also oak, is molded 30 inches and sided 13 inches. It is protected by a 3 x 3-inch stem iron and is reinforced by an apron molded 17 inches and sided 13 inches. The stern post is molded 20 inches and sided 13 inches. The frames, which also are of oak, are spaced on 22-inch centers. They are molded 14¾ inches and sided 12 inches. The remaining details are shown clearly in the accompanying illustration.

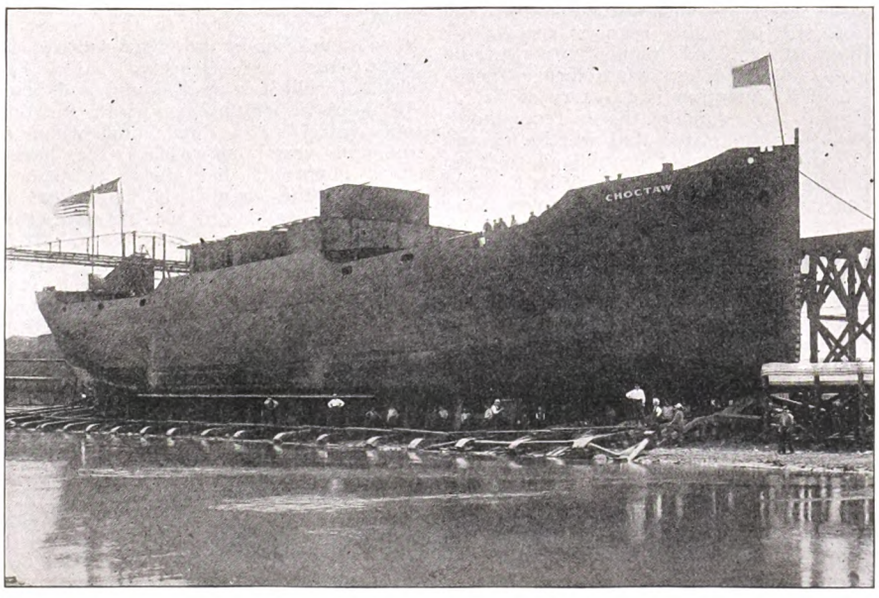


BUILT AT FRESH-WATER YARD FOR SALT-WATER SERVICE

Launched at Chicago

The steamer CHOCTAW, recently launched at the yard of the Chicago Shipbuilding Co., Chicago, is one of the types, which lake builders have been turning out for salt water service. These canal-size steamers have been built in great numbers at most of the lake yards during the past two years and many of them already have shown their seaworthiness on trips through the submarine zone. The CHOCTAW is being built for the Atlantic, Gulf & West Indies Steamship Co., and will be used in the coastwise trade. She is 261 feet over all, 43.6-inch beam and 20 feet molded depth. She will be equipped with two Scotch boilers and triple expansion engines and will carry 3000 tons at 17 feet 6-inch draft. She is expected to reach the coast late this month. The company has two other ships of the same dimensions now on the stocks.

To enter the shipbuilding business on a large scale, the Foundation Co., New York, has announced that it has selected sites at Portland and Tacoma and that work will be started at once. Wooden ships for the government are to be built.



STEAMER CHOCTAW READY TO BE LAUNCHED AT CHICAGO YARD

Shipping Board's Program

The tabulated statement sent by the United States shipping board to the secretary of the treasury for transmission to congress relative to the ship program, is as follows:

BUILDING PROGRAM

	No.	Tonnage	Estimated cost
Ships contrd. for	433	1,919,200	$285,000,000
Ships ready to be contracted for when funds are available.	452	2,968,000	455,500,000
Ships under negotiations ...	237	1,281,400	194,000,000
			$934,500,000
Misc. vessels...	150	1,800,000	300,000,000
Organization and other miscellaneous expenses			35,000,000
Amount authorized by congress June 6, 1917 ($300,000,000 appropriated)			550,000,000
Amount to be authorized for building program immediately in sight, making no allowance for changes in cost or labor and material			719,500,000

COMMANDEERING PROGRAM

For commandeered ships, amount required	$515,000,000
For commandeered ships, amount authorized by congress June 6, 1917	250,000,000
Balance requiring authorization of congress	$265,000,000

PURCHASE PROGRAM

For vessels to be purchased other than under construction or commandeered	$150,000,000

SUMMARY

Total amount, in round figures, to be purchased in addition to amounts already authorized:	
For commandeered vessels.....	$265,000,000
For construction of new vessels.	719,500,000
For purchases of new vessels....	150,000,000
Grand total	$1,134,500,000
Amounts desired to be appropriated for remainder of fiscal year 1918:	
For commandeered vessels.....	265,000,000
For building program.....	400,000,000
For purchase of vessels.....	150,000,000
Total	$815,000,000

On the Coasts, Lakes and Rivers

What's Doing and Who's Doing It

Busy Fall Days on the Lakes

By C. M. Krauss

THE largest ore cargo ever brought to Buffalo was carried by the steamer COLONEL J. M. SCHOONMAKER of the Shenango fleet, which arrived at Buffalo Aug. 17 with 13,340 tons of ore. The previous record had been held by the F. H. GOODYEAR, but the SCHOONMAKER's load exceeded the GOODYEAR's record by 1000 tons. The steamer WILLIAM P. SNYDER of the Shenango fleet, and sister ship of the SCHOONMAKER, arrived at Buffalo Aug. 22 with a cargo of 13,171 tons of ore. At the rate ore has been arriving at Buffalo marine men expect to see all records for ore receipts at that city broken this season.

* * *

An order, amounting to $3,000,000, for the construction of steel ocean freighters, has been awarded by the government to the Saginaw Shipbuilding Co., Saginaw, Mich., which was recently organized with $350,000 capital stock. The vessels will be 260 feet long, 43½ feet beam, with a molded depth of 24 feet 4½ inches.

* * *

C. B. Dunster has been appointed manager of E. N. Breitung & Co., at Cleveland, and assistant general manager of the Breitung properties. For a number of years Mr. Dunster was consulting engineer with the Breitung interests and for the past three years has been manager of the mining department of Breitung & Co.

* * *

Capt. Alvin A. Morrison, who has sailed the steamer EDWIN N. OHL of the Becker fleet, for several seasons, has been ordered to report for duty at the United States naval training station, Great Lakes, Ill. Captain Morrison has served several years in the United States navy and returns as a lieutenant.

* * *

Capt. R. W. England, Cleveland, has been appointed assistant district officer by the United States shipping board. For many years Captain England was master of steamers of the Becker fleet, and last spring resigned as master of the steamer B. F. JONES.

* * *

The United States army engineers have allotted $90,000 for dredging the channel at Vidal shoal, north of the Soo, to a depth of 20 feet at low water. Vessels have been damaged and their capacities greatly reduced on account of the shoals.

* * *

Nearly 85 per cent of the iron ore output of last year was mined in the Lake Superior district. Shipments from all the mines aggregated 77,870,553 tons, an increase of 40 per cent over the previous year. They were valued at $181,902,277, an increase of 80 per cent.

* * *

The steamer WAR PATH was launched at the Detroit yard of the American Shipbuilding Co., Aug. 11. She will enter salt water service for the Cunard interests.

* * *

The steamer WAR PEGUIN was launched Aug. 30 at the Cleveland yard of the American Shipbuilding Co. The WAR PEGUIN, which is full Welland canal size, was ordered by the Cunard interests for ocean service and has been taken over by the government.

* * *

Ore transported from the Lake Superior district in August amounted to 10,146,786 tons. This is 296,646 tons more than the tonnage carried in August, 1916, which was the record month until July, this year, when shipments aggregated 10,241,633 tons. In August 4,300,000 tons of coal were transported on the lakes. This is 80,000 tons more than had ever been carried.

* * *

Charles Kennedy, Buffalo, has been appointed by the government food administration as representative in the Buffalo district. Mr. Kennedy, who has been a grain merchant for the past 30 years, will have jurisdiction over the handling of the millions of bushels of grain that go from all parts of the country to the eastern seaboard. C. H. Williamson, formerly manager of the Lake Grain Elevating association, will be in charge of the grain clearing department under Commissioner Kennedy. Mills, elevators and warehouses will be expected to make regular reports of their stocks and requisitions will be made on the government office as needed. The intention is to carry stocks at Buffalo to supply these requisitions. Mr. Kennedy stated that warehouse and elevator men would be obliged to have a license and the license may be revoked for any violation of the government rules.

* * *

R. L. Ireland, prominent in iron and steel and vessel interests for many years, has resigned from M. A. Hanna & Co., effective Sept. 1. He is a director of the American Shipbuilding Co., Cleveland. L. C. Hanna Jr. and James D. Ireland have become members of the firm. Mr. Hanna has held an executive position with M. A. Hanna & Co., and James D. Ireland, who is a brother of the retiring partner, has been in charge of the Duluth office of M. A. Hanna & Co., as general manager of the firm's extensive ore properties, for several years.

* * *

The Manistee Shipbuilding Co., Manistee, Mich., will begin building ocean-going vessels for the government about Oct. 1.

* * *

The largest docks in Canada will be built by the Canadian Steel Corp., Ltd., for the landing of the company's boats at its plant at Ojibway. The company also will dredge a 2500-foot canal from the Detroit river south into its property to accommodate boats unloading building materials.

* * *

For the first time in the history of the Lorain yards of the American Shipbuilding Co., a vessel was launched without a christening ceremony when the steamer CARMI A. THOMPSON went into the water Aug. 18. The THOMPSON, which is 554 feet over all, 56 feet beam and 32 feet deep, will be operated by M. A. Hanna & Co.

* * *

The steamer DORIC, which grounded in the Lachine canal and is now in dry dock at Cleveland for repairs, may be fitted for salt water service.

* * *

The new Central grain elevator at Buffalo has been completed. This elevator, which has a storage capacity of 2,500,000 bushels, is connected with the Concrete elevator and together they have a total capacity of 4,500,000 bushels, with four marine legs each with a capacity of 25,000 bushels per hour.

* * *

The following notice has been sent to members of the Lake Carriers' association by the secretary, George A. Marr:

"Attention is called to the danger of vessels meeting in the channel approaching Byng inlet, Georgian bay. This channel, which is rock-bound and about 10 miles in length, has width for only one vessel at a time, and when an inbound vessel approaches the harbor it is important that steps be taken to see that the channel is kept clear of outbound boats until the inbound vessel has arrived at the coal dock. It is suggested that the masters of all vessels destined to Byng inlet telegraph from Detroit to J. Little, superintendent Canadian Pacific railroad coal dock, Byng inlet, Ont., giving as nearly as possible the time of arrival. Then if a vessel finishes unloading about the time an inbound vessel is due to arrive she can be held at the coal dock until the latter boat is inside. For convenience upbound boats destined to Byng inlet may enclose telegrams for Mr. Little in a stamped envelope. Mark the envelope "Important Message" and mail it on the mail boat at Detroit river station, addressed to the Postal Telegraph Co., Detroit. The telegraph company will

then send the message "collect" to Byng inlet, where the master can settle for it on arrival."

* * *

The Toledo Sand & Gravel Co. has been awarded the contract for raising the steamer NATIRONCO and coal cargo. The NATIRONCO, which was sunk in a collision in the lower Detroit river, was purchased from the underwriters by her former owner, A. B. Mackay, Hamilton, Ont., for $32,500. The steamer will be sent to the coast as soon as she is repaired.

* * *

The Peninsula Steamboat Co., Sandusky, O., has discontinued business and has sold its principal holding, the passenger and merchandise steamer OLCOTT, to eastern parties, for transatlantic service. For years the OLCOTT was the first boat to leave Sandusky in the spring and the last to lay up in winter.

* * *

Capt. J. T. Rose, member of the Duluth board of trade and one of the best known vessel agents at the American head of the lakes, died at his home in Duluth at the age of 71 years. He entered the general vessel business in 1878.

* * *

The Torcrete Shipbuilding Co., recently organized in Chicago, is reported to be negotiating for a suitable yard location near Detroit. It will build a 1200-ton cargo steamer for Great Lakes service. This ship will be built of a combination of steel and concrete.

Boston Bay Notes

By George S. Hudson

Strikes are causing much delay to coastwise vessels, most of the discontent centering in firerooms of steamers, particularly those engaged in the coal trade between Chesapeake bay and New England ports. The question of increased wages frequently is answered by the operating companies acceding to demands rather than have their tonnage tied up.

* * *

Exportation of rum from Boston has ceased till after the war and denizens of the West Coast of Africa no doubt must conserve the supply that has been shipped by schooner almost monthly since the exigencies of war resulted in consignments of that nature being refused by regular lines. New England distilleries are now producing alcohol to be used in the manufacture of smokeless powder.

* * *

The Purdy Towboat Co., Boston, has purchased of Rockland, Me., interests the 55-foot tug HUGH, which will be used in harbor work.

* * *

Two-thirds of the British steamships regularly operated between New England ports and Europe prior to 1914 have been destroyed by German submarines or mines, their places having been largely replaced by chartered tonnage.

* * *

The Boston Marine Society spends about $12,000 annually for relief of its 87 beneficiaries.

* * *

An U. S. submarine rammed the steamer MAYFLOWER of the Nantasket Beach Steamboat Co., the excursion vessel sustaining damage that will lay her up for the remainder of the season. The accident occurred in Boston harbor during a fog, the captain of the MAYFLOWER blaming the commander of the naval craft.

* * *

F. A. Jones, for years general manager of the Eastern Steamship Corp., has accepted a position as manager of a government shipyard at Portsmouth, N. H., where 30 vessels are to be constructed immediately.

* * *

B. N. Kenney, chief engineer of the Boston steamship PETER H. CROWELL, was drowned off Pernambuco recently. Chief Kenney had been in the employ of the Crowell & Thurlow Steamship Co. several years and resided in Dorchester, Mass.

* * *

D. W. Simpson, a Boston ship broker, succeeds H. M. Whitney as president of the Boston & Gloucester Steamship Co., the latter retiring after service covering a period of nearly 50 years. The company contemplates new ports of call, also a freight boat equipped with modern cargo devices.

* * *

The Boston sailing ship TIMANDRA, which sailed from Norfolk, March 6, for Buenos Aires, has been given up as lost. In some circles it is believed the TIMANDRA was sunk by the German raider SEEADLER. The ship was commanded by Capt. Richard Lee, Yarmouth, N. S., who was accompanied by his wife. The vessel carried a cargo of coal.

* * *

Offers have been made to Paul Butler, Lowell, Mass., owner of the American cup schooner AMERICA, for that vessel which is now laid up at Boston, with view to placing the old queen of the sea in the cargo-carrying trade.

* * *

J. W. Elwell & Co., New York, have purchased the Boston steamer CAPE ANN, which will be converted into a tug for transatlantic towing. For the present the vessel will tow barges between the United States and Martinique.

Pacific Coast News

By R. C. Hill

PUGET SOUND has never witnessed before such a heavy foreign trade as August brought to Seattle and Tacoma. Forty-four steamers arrived from the Orient and west coast ports and an equal number cleared. This sets a record, the best previous month having been May of last year with 34 steamers in the offshore trade. The record of last month was made without the movement of lumber, which heretofore, has always formed a large portion of Puget sound's foreign commerce. August witnessed unprecedented shipments of all kinds of Oriental cargo brought to this port and exceptional quantities of general freight cleared for Japan and China. The nationality of the vessels engaged in this trade is noteworthy. Japan furnished 27 of the total of 44. There were seven under British registry, one Swedish, one Dutch, and seven Norwegian. As proof of the great record established by August, the collections at the Seattle customs house were $282,361 as against $109,115 in August, last year.

* * *

The Alaska fishing vessels are winging their way from the northern waters and already some of them have arrived. The vanguard of the codfish fleet reports that the season has been poor, although the vessels will do well considering the high price for their catch, which in quantity is below the average.

* * *

First of a large fleet of steel steamers under contract, the WAR LEOPARD was launched from the yards of J. F. Duthie & Co., East Waterway, Seattle, Sept. 1. This is the first launching at this plant which has been started since early this year. The WAR LEOPARD is a standard-type, 8800-ton steamer and is building for the Cunard line. The sponsor was Mrs. Charles D. Bowles, wife of the president of the Duthie company. The event was highly successful and marks the first of a series of launchings to occur in the near future. Three other steel vessels of similar type are on the ways at this point. Two other ways are shortly to be added.

* * *

Good progress is being made at Raymond on the new wooden shipbuilding plant of Sanderson & Porter, who have extensive government contracts. The work has been handicapped somewhat by the difficulty in obtaining lumber, owing to the strikes in logging camps and mills. The office buildings are up while dredging, pile driving, construction of work buildings and installation of machinery are being done as rapidly as possible. Six ways are being provided and as soon as lumber is available in quantities, between 1200 and 1500 men will be employed. This yard has good rail connections and is expected to become one of the important plants in this section.

* * *

Another steel vessel of the standard 8800-ton type was given to the water Aug. 16 from the plant of the Skinner-Eddy Corp., Seattle. This steamer is the LIEUT. DEMISSIESSY, built for the French government and named after one of the heroes of the present war. This vessel is the first turned out for the allies under permission of the United States shipping board. She is the seventh launching from this new yard in 11 months.

* * *

While there has been considerable public criticism concerning the management of Seattle's public water terminals, these immense piers and warehouses are at the present time taxed to their capacity, principally with Oriental cargo. The movement of oils from the Orient has been very heavy and the storage tanks for this commodity, constructed by the port commission, are also filled to the brim. Several days ago, it was estimated that the port's terminals contained 41,000 tons of cargo, valued at more than $44,000,000. When the canned salmon movement is on in earnest

within the next month, local warehouse space will be at a premium.

* * *

Vancouver, B. C., is enjoying a spell of prosperity, due largely to extensive shipbuilding. Yards at North Vancouver recently completed the steel steamer WAR DOG for the Cunard line and a sister vessel is soon to be launched. Five motor ships built on the British Columbia side have already sailed for foreign ports with lumber and a dozen more are now on the ways being rapidly completed.

* * *

Since a month ago, the fourth section of the floating drydock for the Todd shipyards at Tacoma has been completed and towed into position. This new Tacoma plant is being built rapidly and actual ship construction is only a matter of the next few weeks. Five hundred men are employed in speeding construction on the various units that will compose this yard. There will be 36 units in the system of aerials for the rapid transportation of materials about the yard.

* * *

Launching of two wooden ships in Seattle characterized the last month. The BARLEOUX was sent into the water by the Washington Shipping Corp., Aug. 1. This vessel has since been turned over to the French government and has the distinction of being the first wooden vessel built on Puget sound for a foreign power. The BARLEOUX is 252 feet in length, with beam of 44 feet and depth of 21 feet. She will have semi-diesel engines of 240 horsepower. This launching is the fifth from this yard. The National Shipbuilding Co. launched its first vessel Aug. 27, when the wooden motor ship APEX left the ways. This vessel is owned by L. H. Wakefield, a local salmon dealer, who will use the APEX in Alaskan trade. This ship will have a cargo capacity for 1100 tons and will be equipped with diesel engines of 350 horsepower. Dimensions are 155 x 36 x 23.6 feet.

* * *

Motor ship GUANACASTE, built on the Columbia river for M. T. Snyder, Mobile, Ala., has been completed and is now on Puget sound taking a cargo of lumber for Panama.

* * *

During the fiscal year ended June 30, 1917, Alaska's commerce established a new high record of $115,000,000, a gain of $19,000,000 over the previous 12 months. Inasmuch as practically all of Alaska's commerce is with Puget sound, these figures are of particular interest to Seattle and Tacoma. The total includes gold valued at $16,000,000 in addition to huge shipments of ore, concentrates, salmon, furs, fish and fish products. Within the last two months considerable quantities of spruce lumber for airplane construction have been received from Alaskan mills.

* * *

In addition to general construction work, the local plant of the Seattle Construction & Dry Dock Co. is exceptionally busy, its drydocks having been operated at high speed for several weeks. At present the Norwegian steamer KEY WEST is on this dock after having been ashore in the Aleutian islands on the return leg of her maiden voyage to the Orient.

Along the Gulf Coast

By H. H. Dunn

TENTATIVE plans have been agreed on for southern pine mills to cut timbers for approximately 200 ships for the nation's wooden fleet, in addition to those for the 63 vessels already ordered, according to lumbermen returning to New Orleans from Washington, who say that the reorganized shipping board is planning to push wooden shipbuilding as well as steel.

* * *

The Piaggio Shipbuilding Co. is about to launch its first vessel from its new yards at Pascagoula, Miss. She is to be a five-masted barkentine, 3600 tons, 301 feet long, 48-foot beam, 14 feet light draft and 24 feet loaded. She will carry two 200-horsepower deisel or semideisel engines for auxiliary power, and will be called CITY OF PASCAGOULA.

* * *

The Murnam Shipbuilding Co. has practically completed two large wooden cradles, at its yard at Mobile, Ala., to be used in building two wooden freighters for the shipping board, costing $450,000 each. The Murnam company announces that it has contracts for four of these vessels.

* * *

Plans are well under way in New Orleans and Tuscaloosa, Ala., for a barge line to bring coal from the Warrior river mines, in Alabama, to New Orleans this winter. The water rate is half the rail rate, which is $1.50 a ton, so that a considerable reduction in the cost of the fuel to Louisiana consumers should result from this increased use of inland waterways. Tuscaloosa has voted bonds for erecting terminal facilities on the Warrior river, down which the coal will be brought. It is planned to put 60 barges into the service, with about six towboats to handle them in fleets of 10 each.

* * *

Walton B. Smith has been appointed assistant instructor in the New Orleans school of navigation, Tulane university, from which he recently graduated.

* * *

Deeds transferring shipyard site property in the Chickasabogue river section, valued at $209,000 from three different owners to the Tennessee Land Co. were recorded in Mobile Aug. 16. Total value of property bought for this shipyard is now $488,650, with other purchases still to be made.

* * *

Capt. A. A. Poland, U. S. A., representing General Black, in inland waterways development, put two first-class steam towboats belonging to the federal government, at the service of a New Orleans packet company late in August. They will be used in towing barges up and down the Mississippi river in an effort to relieve railroad freight congestion northward from New Orleans.

* * *

Four large tropical trading concerns, owning two steamers and two extensive banana plantations, have been merged into a million-dollar corporation, with offices at New Orleans. R. T. Burge, Los Angeles, Cal., is president of the new corporation, which was formed from the Gulf Coast Fruit & Steamship Co., Galveston, capitalized at $250,000; the Associated Tropical Plantation Co., Kansas City, capitalized at $1,000,000; the Gulf Coast Plantation Co., capital stock, $500,000, and the Fort Morgan Steamship Co., Norway and Alabama, with a capital of $300,000. First sailing to Puerto Mexico, Vera Cruz and Tampico, took place Sept. 15. The company owns two large banana plantations near Vera Cruz, Mexico, and will put its two steamers at work carrying merchandise to the three Mexican ports named, and bringing back cargoes of bananas. One of the steamers, FORT MORGAN, was under charter to the Zemurray Steamship Co., but was released Sept. 16.

* * *

Employes of the Bluefields Steamship Co., the Cuyamel Fruit Co., the Vaccaro Bros. Co., and the United Fruit Co. may leave the United States on their regular employment trips, on short notice, without the formality of obtaining passports, according to a ruling by the secretary of state, received by Dufour and Janvier, New Orleans attorneys for one of the steamship lines. Hereafter, certified employes of any of these companies may arrange with the clerk of the United States district court to leave the country on short notice, and passports will be issued for them only in cases of emergency.

* * *

Barges are becoming more and more numerous in traffic on the Mississippi river. The latest to quit the railroads for this means of transportation is the Desha Lumber Co., of Lake Providence, La., which is shipping lumber to Cairo, Ill., by means of two barges, each of which carries 800,000 feet.

* * *

More than 4000 federal licenses to navigate have been issued to boat owners in the eighth naval district from New Orleans alone, since the law went into effect.

* * *

Biloxi Shipyard & Box Co. has turned to shipbuilding and is operating a successful yard on the Back Bay at the Mississippi port.

* * *

W. L. Kelly, president of the Kelly-Atkinson Co., Mobile, Ala., announces that his company has contracts for constructing 18 composite steel and wood ships for the United States shipping board, aggregate value of which is about $10,000,000. The company has bought the Heironymous docks at Mobile, and is erecting its yard. Six launching cradles are being built, and the plant is to be open for work late in September. The plant will employ 1000 persons.

* * *

The Coleman Engineering Co., New Orleans, has acquired an option on $500,000 worth of river front property at Mobile, for shipyard purposes.

Discuss Need of Better Terminals

Experts on Port Development Declare War Success and Commercial Independence Can Be Effected by Improving Freight Handling Facilities

BETTER co-ordination of work in ports of the United States bears a close relation to the winning of this war as well as to success in the economic struggle afterward. How to prepare for this day when port terminals will replace howitzers was discussed at the sixth annual convention of the American Association of Port Authorities in Cleveland, Sept. 11-14. Moreover, the efficiency of freight handling behind the docks not only will determine much of the growth of commerce in the postbellum conflict, but will be a factor in bringing peace in the present war, the delegates were told.

The convention was opened Sept. 11 with an address of welcome by E. S. Griffiths of the Cleveland river and harbor commission, and a response by the president of the association, W. G. Ross, Montreal. The delegates were entertained at a luncheon reception by the chamber of commerce, at which Calvin Tompkins, New York, former commissioner of docks, was the principal speaker. Mr. Tompkins pointed out how the world's shipping is being administered as a great unit, with an efficiency never before attained. The results of this work show what can be done and what probably will be done, at least in a measure, after the war is over.

Papers were read during the day on the following subjects: "Establishment of Exact Lines for Port Planning," by Charles W. Staniford, chief engineer, department of docks and ferries, New York City; "Administration of New York Canals," by Maurice W. Williams, engineer in charge of mechanical equipment of barge canal terminals; "Legal Status of Submerged Land and Littoral Ownership," by Judge Robert M. Morgan, common pleas court, Cleveland. Colonel Lansing H. Beach, United States engineer, described canal operations in various parts of the country.

How "Water-Borne Traffic on the Great Lakes" has grown in about half a century from a few small cargoes to one of the greatest tonnages in the world was interestingly told by Harvey D. Goulder, general counsel of the Lake Carriers' association. In 1679, the GRIFFIN, of about 45 tons, was built. She made one trip and was never heard from again. In the forties of the past century a great statesman, in speaking against a land grant for a canal to connect Lake Superior with the lower waters, said one might as well propose to project commerce up into the moon as into the upper lake region. A few years later the state of Michigan made the improvement and the freight movement through the Soo that year was 14,503 tons. In 1916, it was 92,000,000 tons.

The general opening of navigation, Mr. Goulder said, might be fixed as 1855, the date of the opening of the canal. The growth in lake traffic has resulted in cheaper manufactured products not only along the lakes, but in every part of the country, as the cost of carrying grain and ore on the lakes is only about one-tenth the cost on the railroads.

In the evening a motion picture lecture on the handling of bulk freight on the lakes was given by J. D. Carey, of the Cleveland river and harbor commission.

The Wednesday session was devoted to the discussion of the resolution adopted at the Montreal convention a year ago, calling on the interstate commerce commission to investigate terminal and port conditions, and expressing the need for increased terminal efficiency through pooling and the joint use of terminals. This matter has already been taken up with the commission. The discussion was opened with a general presentation of the problem of port terminal efficiency in its relation to the economic situation in the Americas and to the preparation for trade expansion when peace comes, by Edward F. McSweeney, Boston. Millions of dollars have been spent on docks, he said, but much of it was wasted because there was no vision in planning. Facilities back of the docks were in isolated groups, controlled by separate railroads. Duplication of work, delay and congestion resulted.

How Wooden Ships Are Built---V

(*Concluded from page 376*)

most universally at the present time. In some old ships the frames are square to the load waterline instead of to the keel. In such cases, the necessary allowance must be made.

To determine whether or not the frame is horizontally square to the keel, the following procedure may be adopted: A point is selected on the middle line of the keel at some distance from the frame to be horned, as it is termed, and two other points are marked at equal heights on each side of the frame, say at a frame head. The distance from these latter points to the point on the middle line of keel will be equal if the frame is horizontally square to the keel. It is not necessary to horn every frame in this way nor to check its vertical inclination, since by the aid of ribband battens, when one frame is set correctly a number of others can be set by reference to it. It is, however, advisable to institute checks at intervals. The breadth of the ship at the different frame heads also should be checked from time to time, so that by plumbing and horning, the frames of the ship can be so shored and secured as to insure her external surface being of the designed form.

Putting on Arch Straps

The general method of reinforcing the frames of a wooden ship with steel strapping have been discussed in a previous chapter. When arch strapping, using 14-inch universal plates of the type shown in Figs. 75 and 76 is employed, the frames must be mortised out properly to let in the straps, so the planks will rest on a fair surface. The method of doing this is clearly indicated in Fig. 76, which also shows how the butts of the straps are fastened together and how the straps are bolted to the frames. The upper part of the steel arch where it rises to a point above the main deck is shown in Fig. 75. This form of strapping costs about $3000, including about $1500 for labor and fastenings.

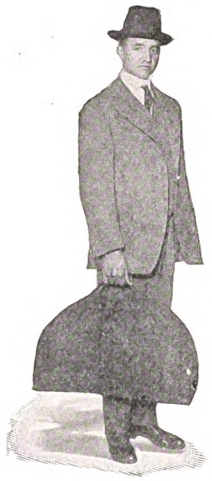
Near the stern of the ship, the frames must be carefully heeled to the deadwood. Fig. 82 shows how this is done. It also shows how the deadwood is clamped together by means of chains and wedges before it is edgebolted.

Alleging that it chartered the American schooner W. H. CLIFFORD for voyage from Pensacola, Mobile or Gulfport to a safe port on the west coast of Italy, and that the agreement was not fulfilled, H. Baars & Co., Pensacola, Fla., have sued the McIntyre Lumber & Export Co., Mobile, for $60,000.

Dr. S. B. Grubbs, for several years in charge of Federal health service at Boston, has been detached for field service. His place will be taken by Dr. Donald Currie, Honolulu.

Equipment Used Afloat and Ashore

Life Preserver Suit—Small Turbine for Use Aboard Ship



The dangers of ocean travel at the present time have brought about the development of various devices designed to conserve lives. Peculiar interest, therefore, attaches to a safety suit life preserver, which the International Life Suit Corp., New York, is now distributing. This company recently has taken over the sole selling and distributing rights in the United States, Canada and throughout the world for this suit, which is described as one in which "you cannot drown, you cannot chill".

These safety suits already have been used in actual emergencies. They are being used in the patrol squadrons and elsewhere in the United States navy, and whole hospital units thus are being protected. They are expected to be used extensively on the new merchant ships now being built. A number of passengers on transatlantic liners also are carrying them. As a result of this demand, the company for a time found its greatest problem to be one of furnishing an adequate supply. The company now has arranged for sufficient factory equipment to insure continuous output. The suits have found use on Great Lakes steamers, coastwise boats and among yachtsmen and owners of small crafts.

This suit was developed as a result of the sinking of the TITANIC. Oscar A. Youngren, who had previously given considerable thought to safety at sea, redoubled his efforts to develop a simple life preserver which would not only keep the wearer afloat, but would prove a protection from the cold.

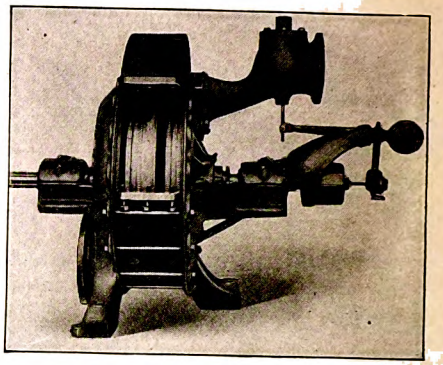
The suit is made in one piece, as illustrated in the accompanying illustrations. A number of public and private demonstrations of this suit have been given.

James A. Watt is president of the International Life Suit Corp.; Louis S. Bruenn, vice president; John D. Dunlop, treasurer, and Oscar A. Youngren, secretary.

The Henry Piaggio Shipbuilding Co., Pascagoula, Miss., has bought enough more land on East Pascagoula river to give it 1549-foot frontage on that stream, by 1600-foot depth, or approximately 60 acres. The company will double its capacity at once, and is installing machinery and ways for that purpose.

New Small Turbine

A new adjustable-speed steam turbine has been developed by the General Electric Co., Schenectady, N. Y. The new turbine is applicable to fans, blowers, pumps and other auxiliary apparatus on shipboard, as well as in power plants. The impulse type has been adopted for the new series of turbines, which are supplied in several sizes, the number of stages and rows of buckets depending upon capacity. A split wheel-casing, shown in the accompanying illustration, is used to permit ready inspection of the buckets which are made of bronze and are dove-tailed into the rim of the wheel. The exhaust steam is said to be free from oil and therefore is suitable for heating feed water. Speed regulation may be obtained by operating a hand wheel while the turbine is running. A governor mounted directly on the shaft, controlling a double-balanced, piston-valve throttle maintains constant running speeds. The main shaft of the turbine runs on babbitt bearings and is fitted with accessible packing glands.



SMALL TURBINE

SAFETY SUIT READY FOR USE

Drills and Air Tools

The Independent Pneumatic Tool Co., Chicago, is distributing a bulletin in which the company's line of pneumatic tools and electric drills is described and illustrated. These tools are being used by shipbuilders, boilermakers, foundries, car works, structural plants, railroads, steel mills, locomotive shops, automobile and airplane builders. The bulletin is illustrated with a large number of views showing the wide range of products manufactured by the Independent company, and also contains specifications for pneumatic hammers, pneumatic drills and electric drills.

New Architect Firm

Morris M. Whitaker, one of the oldest naval architects in the power boat field, and F. Huntington Clark have formed a partnership to act as consulting naval architects and engineers. The new concern will be known as Clark & Whitaker, Inc., with offices on the thirty-first floor of the Singer Tower, New York. It will specialize on reinforced concrete ships, on which Mr. Clark has a patent for the construction.

The Minneapolis Steel & Machinery Co., Minneapolis, is building 1000 steam hoists for the new government merchant marine. Each hoist consists of two cylinders with a hoisting drum and two winches. The frames are cast iron and the entire weight of each hoist is 5000 pounds. The Minneapolis Steel & Machinery Co. also has received an order from the Emergency Fleet Corp. for 60 steering engines.